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ABSTRACT

This report contains several articles that focus on the new digital divide, which is no longer just one wide gap between those with and those without computers, but is instead a series of divides that create inequities for different reasons. The first article explains how certain types of students are not getting the high-tech experiences they need in school. These include low income, minority, female, low achieving, rural, special needs, and limited English speaking students. The second article looks at how Pittsburgh's public schools are grappling with the human and technical nuances of the digital divide. The third article discusses how, with 20,000 technology services scattered across the country, schools and communities are seeing progress in closing the digital divide. The fourth article examines data from a survey of high school students that indicates that schools are not using technology as wisely or effectively as they could. The fifth article discusses new challenges as computer access spreads and schools look for ways to use technology to raise student achievement. The sixth article looks at how some states are taking more aggressive approaches than others to close the digital divide. The last section contains state profiles with demographic information and statistics on number of students per instructional computer and E-rate funding. (SM)

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TECHNOLOGY COUNTS 2001: THE NEW DIVIDES
LOOKING BENEATH THE NUMBERS TO REVEAL DIGITAL INEQUITIES

Education Week, Volume XX, Number 35
May 10, 2001

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The New Divides

There was a time, not long ago, when the so-called digital divide was perceived and illustrated as a huge canyon or a miles-wide river. On the one side stood the technology-rich, happy because they had access to computers at school and home. On the other stood the technology-poor, unhappy because they had no access at all.

But using such metaphors to illustrate the digital divide in the 21st century would be largely inaccurate. To be sure, inequities in the availability of computer technology and Internet access still exist. But rather than one single, gaping divide, what the nation's schools are grappling with is more a set of divides, cutting in different directions like the tributaries of a river. And, increasingly, those inequities involve not so much access to computers, but the way computers are used to educate children.

"Everybody is still struggling" with the complexity of the problem, says Christopher J. Dede, co-director of the Technology in Education Program at Harvard University. "You're not going to find any district that says, 'We've solved this.' "

What has improved rapidly is the deployment of computers in schools, even in poor communities. Student-to-computer ratios for students attending the country's poorest schools are not far from the national average. Internet access--although far from ubiquitous--is no longer reserved just for schools in middle-class or wealthy communities.

Beyond that, more than 20,000 digital-divide services are spread across the nation, providing everything from special computer training for school-age children to low-interest loans to help some financially strapped families of public school students buy home computers.

With evidence of so much progress, some public policy officials are questioning whether the digital divide is really as serious as some say it is. At a press conference this past winter, the new chairman of the Federal Communications Commission, Michael K. Powell, suggested that the digital divide is more of a "Mercedes divide." In other words, everyone would like to have one, but you can still get to where you need to go with a less expensive machine.

Others--especially those who are questioning the large sums of money schools are investing in technology--argue that the digital divide is capturing too much attention and stealing limited resources from more important priorities: improving teachers' salaries, lowering pupil-teacher ratios, and repairing or replacing aging school buildings.

But advocates of a central role for technology in learning counter that the problems of the digital divide are far from solved.

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Related *Education Week* stories:

"Rating the E-rate," Sept. 20, 2000, from our special report *Global Connections, Local Static: Gauging the E-rate's Impact* .

"Study Finds Disparity in Internet Use," May 24, 2000.

"Poorer Schools Still Lagging Behind on Internet Access, Study Finds," Feb. 23, 2000.

For background, previous stories, and Web links, see our Issues Page on The Digital Divide.

Read our previous *Technology Counts* reports:

- *Technology Counts '00-*

- *Technology Counts '99: Building the Digital Curriculum* , September 1999.
- *Technology Counts '98: Putting School Technology to the Test* , October 1998.
- *Technology Counts '97: Schools and Reform in the Information Age* , October 1997.

The rapid infusion of computers into the nation's schools is closing the so-called digital divide, but inequities still persist.

They say many questions remain to be answered. How often are students using the Internet and other computer resources to learn, and for what purposes? Are youngsters using school computers that can handle large amounts of data and employ sophisticated communication tools? Or are they working with obsolete machines that belong in a junkyard rather than a 21st-century classroom?

Other questions add to the complexity of the issue: Do some schools have the technical support necessary to keep machines running while others do not? Are teachers in one district getting better training to understand how to use technology to enhance learning, while teachers in another district are left to themselves to figure it out?

And, lastly, do all kinds of students--low achievers and high achievers, minority and white children, girls and boys, well-to-do and poor youngsters--benefit equally from the technology available in schools?

Margaret Honey, the director of the Center for Children and Technology in New York City, says the answers to those questions depend, in large part, on how much thought schools have put into the role technology should play in learning. Unfortunately, she says, many schools--although they have plenty of computers available--are using them in ways that will do little to close the digital divide or enhance student learning.

Says Honey: "The bottom line is, you don't just put technology into schools or into homes and expect miracles to happen. The technology is only as good as the program that surrounds it."

Some argue the digital divide is stealing too much attentionó*and money* ófrom more important priorities.

To help educators better understand the complexities of the digital divide and establish programs to help close the gaps that exist, *Technology Counts 2001* examines the issue from several angles, beginning with a section titled "Dividing Lines," (see menu above right) which identifies the kinds of students who appear to be losing out when it comes to technology. For a variety of reasons, those students include poor children, minority students, girls, low achievers, students learning to speak English, children with disabilities, and youngsters who live in rural areas.

To show how district-level decisions are closely linked to closing the digital divide, the realities of one urban district's technology efforts are illustrated in "Beyond Machines," a story about the Pittsburgh city schools' growing awareness that it is human factors, as much as hardware and software improvements, that will enhance the use of technology for all students. As one district technology expert puts it: "Without focusing on human beings, we've lost some ground."

Still, there is a growing consensus that closing the digital divide in any community will require efforts that go beyond school programs. Technology experts say businesses, local government agencies, and community organizations must also pitch in. "Closing the Digital Divide" is a comprehensive look at the nation's efforts to put technology into the hands of those who are least likely to have access to itóand to help them learn to use it in ways that will enable them to improve their lives. A Web site that links to a directory of more than 20,000 digital-divide services is included in the story, which is followed by six snapshots of such programs.

To fully understand today's digital inequities, educators must look beyond the machines.

This year's *Technology Counts* also includes results from a new survey of 500 middle and high school students. *Education Week* sponsored the poll in partnership with Harris Interactive and Market Data Retrieval. Among other findings, the results suggest that schools may not be harnessing the powers of technology as effectively as they could. For instance, 92 percent of the students surveyed said they believed that having good computer skills improves the quality of a person's life "a great deal" or "somewhat," but only 40 percent said they believed that knowing about computers is "extremely" or "very" important to how well they perform in school.

Indeed, technology experts say that schools still have much work to do. To understand better the breadth and depth of what lies ahead, "New Challenges" presents a host of statistics and analyses about technological access, capacity, and use. Some of the numbers and conclusions are heartening; others are not.

"We've definitely seen evidence that the digital divide exists, but [we've also seen] trends that it is improving," says Kathleen Brantley, the director of product development at Market Data Retrieval, a Shelton, Conn., market research firm that tracks technology trends in schools.

As with other equity issues in education, state legislatures and departments of education are leading players because they make funding and policy decisions that can help bridge whatever divides exist between local districts. "Across the Nation" takes a look at the progress states are making on this front. When viewed collectively, state-by-state approaches to equalizing access to technological resources--and the results gained from those efforts--are far from uniform.

Brief analyses of what each state has done, or failed to do, to try to close the digital divide are also included, as are data tables with state-by-state statistics on technology use in schools.

The goal of *Technology Counts 2001* is to advance understanding of just what the digital divide means for America's schools and communities. The editors of *Technology Counts* hope you'll find information here that will help you improve student achievement and meet the challenges of the digital age.

The Editors

Technology Counts 2001 was partially underwritten by a generous grant from the William and Flora Hewlett Foundation.

On The Web

The report "The Power of the Internet for Learning: Moving From Promise to Practice," from the Web-based Education Commission, includes the chapter "Access to Broadband Technologies: Bridges Across the Digital Divide."

PBS's series on The Digital Divide takes a look at how computers and technology have widened gaps between gender and racial groups at work and in the classroom.

The Digital Divide Network provides information, current research and resources about the topic.

Read the findings of *Technology in Education 2000* from Market Data Retrieval, highlighting survey results of technology in public schools.

PHOTOS: The rapid infusion of computers into the nation's schools is closing the so-called digital divide, but education technology advocates say inequities persist beneath the surface. Certain types of students, some researchers argue, are not getting the high-quality technology experiences they need. And some schools are far less sophisticated technology users than others.
Allison Shelley

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THERE'S MORE THAN ONE DIGITAL DIVIDE

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Dividing Lines

At first glance, it's tempting to conclude that the digital divide is closing, declare victory, and move on to other priorities.

Indeed, some policy analysts--such as Adam D. Thierer, an economist at the Heritage Foundation in Washington--are making such overtures. They argue that even social and demographic groups that were clearly on the wrong side of the divide just a few years ago are no longer as digitally disenfranchised as some technology experts say.

For example, schools in high-poverty communities have one computer for every 5.3 students, just slightly higher than the national average of 4.9, according to Market Data Retrieval, a Shelton, Conn., firm that tracks those numbers.

Beneath such figures, though, far different pictures emerge, and they show continuing disparities in access to high-quality technologies and serious inequities in how technology is used for different groups of students.

This year's *Technology Counts* looks beneath the statistics, such as student-to-computer ratios, to shed some light on why specific groups of students are still losing out and what might be done to bridge the gaps. Writers for this report looked specifically at the following groups: students from poor families, minority children, girls, low achievers, students learning to speak English, children with disabilities, and youngsters who live in rural areas.

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With poor children, student-to-computer ratios belie huge gaps when it comes to Internet access, according to the U.S. Department of Education. In schools where fewer than 11 percent of students qualify for federally subsidized lunches, for example, 74 percent of classrooms have Internet access. On the other hand, in schools where 71 percent or more students are living in poverty, only 39 percent of classrooms are connected to the Internet.

While a school's poverty rate is a strong predictor of how much Internet access it offers its students, money isn't the only factor that is drawing dividing lines.

According to a study by researchers at Vanderbilt University in Nashville, Tenn., white students--even when income is taken into account--were more than twice as likely to have access to home computers as black students are. Even the white students who didn't have home computers were more likely to log on to the Internet at other locations than their black peers who didn't have access at home.

Is It Digital Discrimination?

But why are some groups losing out? Is it digital discrimination, personal preference, or a combination of factors that leaves some students on the wrong side of the divide?

Those questions arose time and again when *Technology Counts* examined why so few girls are enrolling in technology-related courses, such as computer networking, that can lead to relatively high-paying jobs straight out of high school. And only 15 percent of the students taking the Advanced Placement exam for computer science last year were girls, according to the New York City-based College Board, which sponsors the AP tests taken by many top college-bound students.

Some gender-equity advocates suggest that subtle forms of discrimination, such as beliefs that girls are not well-suited for technology jobs, are discouraging them from even taking technology courses. Others say it's likely the small number of girls in technology-related classes has more to do with different preferences than anything else, and it would be a mistake to pressure girls to enter technical fields when their interests lie elsewhere.

> Researchers say certain types of students are not getting the high-tech experiences they need.

This year's *Technology Counts* also found that, inside classrooms, teachers are making decisions that could be contributing unintentionally to the digital divide.

A growing body of research shows, for example, that teachers tend to infuse technology into lessons much less with low-achieving students than with high achievers.

Many teachers say they would like to integrate more technology into classes for lower achievers, but the realities of teaching make it difficult. With tight time constraints, such as 45-minute periods in many high schools, some teachers feel they have to forgo technology use to make sure they cover the prescribed curriculum--a more time-consuming task with students who have weaker skills or less motivation.

Similar difficulties often lead teachers of bilingual students to limit the use of technology in their classes, too, according to advocates for students who are still learning English.

"What we found is there was very little use by [those] students of computer labs, either because the teacher didn't take them or their schedule was full, or there wasn't a bilingual person to assist students in the lab," says Jane E. Lopez, a lawyer for Multicultural Education, Training, and Advocacy Inc., a Boston nonprofit organization that monitors services for students with limited English skills. "When schools put money into these labs and say, 'All kids benefit,' that's not necessarily the case."

Legal Battles

Advocates for students with special needs say schools must be aware of technological inequities and take steps to fill the gaps. And if schools ignore the problem, parents might turn to the courts for help.

In Oregon, for example, a group of parents filed a lawsuit in 1999 against the state, arguing that their children with learning disabilities were not permitted to use technology tools when they took standardized state tests. As part of a settlement reached this year, Oregon students with such disabilities are now allowed on a case-by-case basis to use spell-checking software, dictation machines, and other technology tools to help them when taking state exams.

For some students, though, it's not a question of academic motivation, how well they speak English, or whether they have a disability. Rather, they're finding themselves on the wrong side of the digital divide simply because they live in remote rural areas. Their schools are struggling with what technology experts call the "last mile" problem.

Simply put, it's too costly for telecommunications companies to lay the fiber-optic cable necessary to run high-speed Internet lines into those communities, because there are just not enough customers. As a result, in some rural communities, slow Internet lines mean it takes up to half an hour to download a few e-mail messages.

Still, many school districts--in rural as well as urban areas--are building the infrastructure necessary to infuse more technology into their classrooms, says Steven A. Sanchez, the director of curriculum, instruction, and learning technologies for the New Mexico education department.

> Is it digital discrimination, personal preference, or a combination of factors that leaves some students on the wrong side of the divide?

At the same time, he says, a "learning divide" is evolving--one in which concerns about differences in access to current communications technologies are being replaced by worries that some educators are using technology wisely and efficiently while others are not.

The problem, Sanchez says, goes "way beyond a lack of machines."

The Editors

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Money Matters

By Robert C. Johnston

America's digital divide no longer appears to be the metaphorical canyon it once was, lined on opposite sides by technology haves and have-nots. Today's divide acts more like a balloon: As the gap in computer access is squeezed in one place, bulging disparities, based on wealth, appear elsewhere.

Between 1984 and 2000, the number of students per computer in public schools dropped from 125 to just five--and the ratio was nearly the same when poverty was factored in.

At the same time, data reveal that needy students are the most likely to lack Internet access, and the most likely to use computers for simple tasks, such as repetitive drills, in school and at home.

"At first, we said, 'Oh my God, look at the numbers [of computers],'" says Norris E. Dickard, a senior associate with the Washington-based Benton Foundation, which promotes the use of technology to address social issues. "Now, we're probing below the surface. We're asking how much are students using them, and can students go to places where they can turn them on and do reports."

Limited access to high-speed connections also continues to hinder technology use in poor urban and rural communities.

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The Poverty Link

Access Numbers

Last year, high-poverty schools had 5.3 students per computer, just slightly more than the 4.7 students for each computer in lower-poverty schools, according to Market Data Retrieval, a Shelton, Conn., firm that does educational-marketing research. MDR also found that 92 percent of needy schools had Internet access, just a little less than the 96 percent of all others.

That's the good news.

A more detailed breakdown by the U.S. Department of Education by degree of poverty found large gaps between the wealthiest and the poorest public schools.

In schools where fewer than 11 percent of students qualified for subsidized lunches, the percentage of classrooms with Internet access skyrocketed from 4 percent to 74 percent between 1994 and 1999. Where at least 71 percent of students qualified for subsidized lunches, classroom Internet access rose from 2 percent to 39 percent in that time.

Such disparities are even greater in the nation's households.

The U.S. Department of Commerce reports that 19

Related *Education Week* stories:

"Initiative To Help Identify Free Internet-Access Sites," April 4, 2001.

"Following the Money," Sept. 20, 2000, from our special report *Global Connections, Local Static: Gauging the E-rate's Impact* .

"Study Finds Disparity in Internet Use," May 24, 2000.

"Poorer Schools Still Lagging Behind on Internet Access, Study Finds," Feb 23, 2000.

"Philanthropic Effort Aims To Help Close eDigital Dividei," Nov. 17, 1999.

percent of households with incomes below $15,000 a year owned computers last year--up from 15 percent in December 1998. Meanwhile, 86 percent of households earning $75,000 or more a year had a computer at home in 2000.

As the gap in computer access is squeezed in one place, bulging disparities, based on wealth, appear elsewhere.

About 11 percent of households in rural areas and 14 percent in central cities that earned below $15,000 a year could go online in 2000, compared with nearly eight in 10 households earning at 'east $75,000 a year.

Before each student received a free computer at one New York City school, it was easy to see how those inequities played out. "Some students would make beautiful diagrams to add to their work, while others would use tracing paper and pens," said Michelle Zernone, the director of the Manhattan Institute of Academics and Visual Arts. "I have pretty caring and dedicated teachers, so no one would hold it against students. But the shame was that you could see which children were disadvantaged."

Hope and Frustration

As a computer tutor at the same Los Angeles community center where he honed his own technology skills, Martin Lozano looks beyond the numbers to see a more complex picture of the digital divide.

The son of first-generation immigrants from Mexico, Lozano was 13 when he started going to a community center sponsored by the Bresee Foundation, a local nonprofit group that promotes computer literacy and job training.

Now a 22-year-old computer science major who has crossed the digital divide, he imparts similar skills to dozens of students at the same center.

But he says problems persist, and they are based largely on family income.

For example, he tells the story of a single mother who had no money left for software after spending $3,000 on a computer for her son. "The salesman told her everything she needed was on the computer," Lozano says. "She didn't know they could get a computer and the software for a lot less."

On average, 19% of below-average income households own a computer, while 86% of above-average income households own one.

Danielle Walters, who works with the Stateway Gardens public- housing project in Chicago, says there are other obstacles to technology access that get little attention.

Roughly 40 percent of the complex's 700 families lack telephone service, she points out. When she conducted a survey to find out why more residents didn't use phone lines, she was amazed to learn a common reason was that they couldn't afford the service calls to repair lines damaged by rats.

Gaps in Use

Even when access to technology is abundant, the well-to-do and the poor use it differently.

A report released in January by Henry J. Becker, a professor of education at the University of California, Irvine, found that half the children from high socioeconomic backgrounds who had computers at home used them for word processing, compared with only 24 percent of children from low socioeconomic backgrounds.

He found similar differences for school assignments, e-mail, graphics, and educational programs, with the better-off youngsters again more likely to use the home computers for those purposes.

.Becker argues that computer use by all students falls short of potential, but he expresses particular concern that students from poor families "are far less likely to use computers at home for what many middle-class children experience as common, ordinary activities" such as using the Internet to do research. On the other hand, students from poor homes tended to use computers more to play games than anything else.

Even when access to technology is abundant, the well-to-do and the poor use it differently.

The Maryland Department of Education and the Maryland Business Roundtable for Education released a report in January that had similar findings for schools. According to the report, 72 percent of the state's classrooms are connected to the Internet, up from 58 percent in 1999.

But Maryland students at schools in wealthier areas are more than twice as likely as their peers in poorer communities to use technology to gather, organize, and store information. They are also three times more likely to use technology to perform measurements and collect data.

On The Web

"E-Rate and the Digital Divide: A Preliminary Analysis From the Integrated Studies of Educational Technology," from the Department of Education, concludes that the E-rate program has been successful in assisting most schools gain access to the Internet, but the poorest schools are still missing out. (Requires Adobe's Acrobat Reader.)

"Internet Access in U.S. Public Schools and Classrooms, 1994-1999," from the National Center for Education Statistics, found wide disparities. (Requires Adobe's Acrobat Reader.)

BBC News Online examines the problem of the digital divide on global level in "Bridging the Digital Divide," Oct. 14, 1999. "More than 80% of people in the world have never even heard a dial tone, let alone surfed the Web. And the gap between the information haves and have-nots is widening," the report says.

"Telecommunications: Characteristics and Choices of Internet Users," February 2001, from the General Accounting Office, finds that the majority of Internet users were more likely to be well-educated and have higher-than average household incomes. (Requires Adobe's Acrobat Reader.)

PHOTOS: As a computer tutor at a Los Angeles community center, Martin Lozano, 22, sees how far behind some people are in developing technology skills.
Davis Barber

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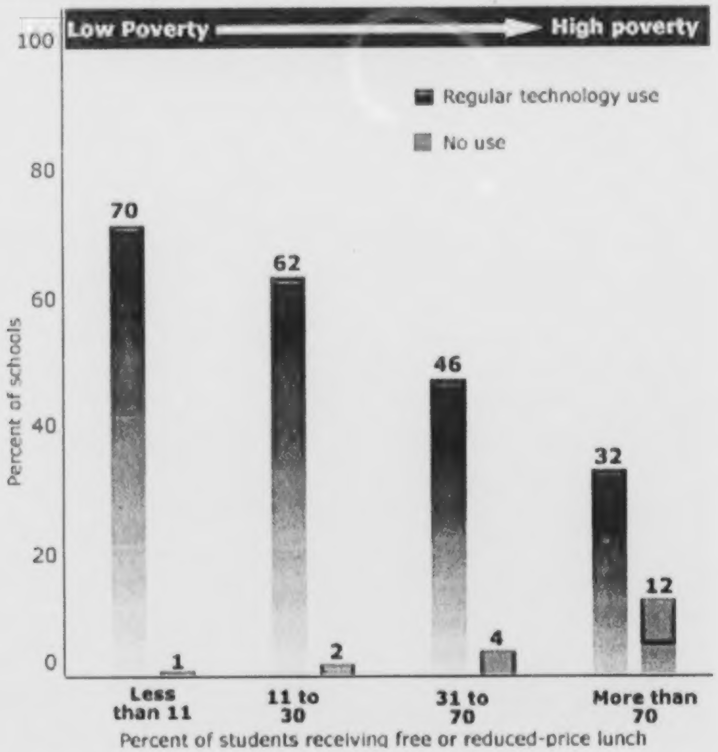
☐ In Maryland, the number of schools reporting that their students regularly use technology to gather information from a variety of sources, such as the Internet, decreases as the percent of students receiving free and reduced-price lunch increases.



☐ SOURCE: Maryland State Department of Education and the Maryland Business Roundtable for Education, 2000, msde.aws.com/digitaldivide.asp

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THE ISSUES

May 10, 2001

Racial Disparities

By Karla Scoon Reid

The digital divide, in its simplest definition, is a matter of dollars and cents: The less money you have, the less likely you are to own or use a computer. That fact helps explain why African American, Hispanic, and American Indian students--many of whom come from families with limited means--tend to have less access to computers, and to use them in less sophisticated ways, than their white classmates.

But money doesn't tell the whole story, many researchers and educators believe.

Even when income is taken into account, white students are still more likely than their black peers to have a computer at home, according to a 1998 study conducted by two Vanderbilt University researchers. And of the white students who didn't have a computer at home, 38 percent had used the Internet at some other location within the past six months, compared with just 16 percent of black students who lacked a home computer, the study found.

Another study, released last year, found that although computer access at school was improving for some racial and ethnic groups, African-American and Hispanic students don't log on to the Internet as often as their white classmates. Only 15 percent of the African-American students who were studied, and just 12 percent of the Hispanic students, used the Internet at all, compared with 21 percent of white students.

"There's a racial line and not just a class line" in technology use, says Princeton University professor Alan B. Krueger, who conducted the study.

Those findings suggest that race and ethnicity matter when it comes to the technology gap, and that closing the digital divide is more complex than providing all students with computers.

"It's not simply a matter of getting people's hands on technology--in a sense, that's the easy part," says Laura Jeffers, a senior research associate for the Center for Children and Technology, located in New York City. "Context is critical. The environment, the expectations, and what people bring to [technology] play major roles in what access really means on the ground."

Digital Racism?

There's no clear reason for the racial and ethnic disparities, but some possible factors include discrimination, minority students' relative lack of exposure to computers, and a dearth of racially and ethnically diverse content on the Internet.

Herbert Kohl, the director of the Center for Teaching Excellence and Social Justice at the University of San Francisco, believes that "covert racism" limits what children of color are allowed to achieve using computers.

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Related *Education Week* stories:

"Study Finds Disparity in Internet Use," May 24, 2000.

"Black to the Future," Commentary, Jan. 12, 2000.

Kohl, who has visited classrooms in New York City, Chicago, Atlanta, and southern Texas in recent years, says students in schools with predominantly minority enrollments are more likely to use their state-of-the-art technology for drill, practice, and test-taking skills. Meanwhile, white students in more affluent communities are creating Web sites and multimedia presentations.

"The computers become nothing much more than trivial workbook and control mechanisms for kids" in the heavily minority schools, Kohl contends. "In other communities, they are instruments used toward the success and the futures of kids."

Findings suggest that closing the digital divide is more complex than providing all students with computers.

Edward L. Bouie, the executive director of information systems for the DeKalb County schools in Decatur, Ga., says he has seen the same phenomenon in his 96,000-student district.

"Technology is just another way to manifest attitudes that have existed for years about children and the type of instruction certain children receive, and the kind of courses certain children are allowed to take," Bouie says.

Bouie, who runs an after-school computer program for parents in DeKalb County, adds that teachers who are skilled at integrating technology into the curriculum usually work at schools in affluent communities, not those with high percentages of lower-income minority students.

At poorer schools with predominantly minority enrollments, technology often isn't a high priority, says James L. Smith, the chairman of the Minority Leadership Symposium for the International Society for Technology in Education, based in Eugene, Ore.

A National Center for Education Statistics study last year found that 45 percent of teachers in schools that served predominantly minority students used computers or the Internet for instruction during class, compared with 56 percent of their colleagues in schools with few minority students.

"It takes more time to put technology into a lesson," says Smith, a program specialist for the education technology department of the Olympia, Wash., schools. "Schools targeted for poor performance are dealing with other issues. Technology is last on the totem pole."

Wanted: Spanish-Speaking Teachers

Schools have a critical need for more minority and Spanish-speaking computer instructors to make minority students more comfortable using technology, adds Elsa E. Macias, the project director for information-technology research at the Tomas Rivera Policy Institute, a Claremont, Calif.-based think tank that studies Latino issues.

"Culturally, who are you going to turn to?" she says. "Someone who looks like me and speaks my language."

Once people understand the value of computers, they tend to seek out opportunities to log on, says Anthony G. Wilhelm, the director of the communications and policy program at the Washington-based Benton Foundation, which advocates ways to close the digital divide.

But gaining that understanding is difficult, he says, if people have little experience with computers. That situation will change as they are exposed to family members, neighbors, classmates, and co-workers who are using technology, Wilhelm says.

"The Internet doesn't look like America, yet," says one educator.

Community-based organizations and churches, which are prime gathering places for many blacks and Hispanics, need to tap into technology, says John Villamil, the vice president and chief information officer of ASPIRA, a Washington-based national nonprofit organization devoted to the education and leadership development of Latino youths.

"We go where they are," says Villamil, who supervises ASPIRA's 45 community technology centers nationwide. "It's a matter of building trust."

The growth of more content on the Internet that takes minorities' interests into account also will help, Wilhelm adds. "The Internet doesn't look like America, yet," he says.

Encouraging Signs

Villamil is encouraged that bilingual and Spanish-language Web sites are on the rise, but he says Hispanics can be turned off when word processing software rejects Spanish names as spelling errors. Some Hispanic parents with limited English skills, meanwhile, are reluctant to let their children use the Internet for fear of losing control over them, Macias adds.

Still, there are signs that technology is starting to take hold in minority communities. Market studies show significant increases in the purchase and use of computers by African-Americans and Hispanics as technology costs decline.

Schools have a critical need for more minority and Spanish-speaking computer instructors to make minority students more comfortable using technology.

"African-Americans have proven time and again that they are willing to adopt new technology, but only at affordable price points," says Barry Cooper, the founder and chief executive officer of Black Voices, an online community designed for African-Americans.

And at the Milwaukee Education Center Accelerated Middle School, which serves 900 predominantly black and Hispanic students, computer teacher Marvin Bell says technology is motivating his students to learn and be creative. The students routinely develop PowerPoint research presentations; last year, they used computers to create a board game based on the Underground Railroad.

Bell, who runs a summer education program that lends students laptops, says his students' enthusiasm for computers is having a positive influence at home. He makes technology house calls to help students and their parents connect their computers or install software.

"More and more [parents] are grudgingly making the purchase," Bell says. "Throw in a couple of pairs of Michael Jordan [sneakers] and Coach bags, and you've bought yourself a computer. And it lasts longer, because children's feet are going to grow."

On The Web

"The Digital Divide in Educating African-American Students and Workers," from the Industrial Relations Section, Princeton University, shows a disparity in computer use between minority and white students in the classroom. (Requires Adobe's Acrobat Reader).

The most recent installment of "Falling Through the Net: Toward Digital Inclusion," from the National Telecommunications and Information Administration, says that minority groups have made "impressive gains" in Internet access. For context, read "Racial Divide Continues to Grow," a fact sheet on the 1999 edition of the report.

"Is the Digital Divide a Black Thing?," from *Salon* , March 2, 2000. Author Lee Hubbard says that African American executives in Silicon Valley are arguing that the digital divide is about class, not race.

The Technology Access Foundation, established in 1996, works to help minority students gain access to technology in small community settings.

Read "The Evolution of the Digital Divide: Examining the Relationship of Race to Internet Access and Usage," March 2000. This report by Vanderbilt professor Donna Hoffman explores patterns of technology deployment among different races.

PHOTOS: Murad Jettawi, 12, looks through a digital video camera at teacher Marvin Bell, a technology instructor at the Milwaukee Education Center Accelerated Middle School, which has about 900 students.
Mary Jo Walicki

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THERE'S MORE THAN ONE DIGITAL DIVIDE

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May 10, 2001

Not Enough Girls

By John Gehring

Ashley Weagraff doesn't worry about the boys anymore. She is the exception.

One of the few girls taking technology-related classes at G. Ray Bodley High School in Fulton, N.Y., the 15-year-old fought back her initial anxiety and now works well with male students in a computer-enhanced technical drawing, design, and production class.

But she still knows well the fear that keeps many girls from taking similar courses that feature a heavy dose of technology. "A lot of the time, girls steer clear of technology classes because they are intimidated by the majority of males in the classes," she says.

The gender divide in technology classes at Weagraff's school is not an anomaly. Across the country, the vast majority of girls shy away from technology-related classes. Last year, for instance, only 15 percent of those taking the Advanced Placement exam for computer science were girls, according to the College Board, which sponsors the exams.

Results from a national survey released in January by the University of California, Los Angeles, in conjunction with the American Council on Education, showed that male college students were twice as likely as their female peers to rate their computer skills as above average, and five times more likely to pursue careers in computer programming.

The U.S. Department of Education reports that in 1998 women received 27 percent of undergraduate degrees in computer science, down from a high of 37 percent in 1984--a gender divide in technology education that is contributing to an already acute shortage of skilled technology workers.

Charts

Gender 'Tech-Equity'

While overt discrimination against girls in schools appears to be rare, students, teachers, and advocacy groups say that work remains to be done in lifting the subtle barriers that still limit young women from having the information and opportunities to explore technology-rich classes.

Those roadblocks range from teachers who grew up in an era when careers were often starkly delineated along gender lines to outdated school counseling material. Experts also suggest that because most school districts are occupied with the demands of standards-based reform and high-stakes testing, trying to get schools to think more critically about gender stereotyping and increasing the number of girls in technology-related courses can be difficult.

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Related *Education Week* stories:

"Federal Study Finds Gains in Gender Equity," May 3, 2000.

"Tech-Savvy Girls," April 26, 2000.

"The Silent Gender Gap," Commentary, Nov. 17, 1999.

"Science, Math, and Girls," Commentary, Sept. 15, 1999.

"AAUW Study Finds Girls Making Some Progress, but Gaps Remain," Oct. 14, 1998.

"Computer Classes Aren't Just for Boys Anymore," Jan. 21, 1998.

"The Electronic Gender Gap," Dec. 4, 1994.

Donna Matteson, a teacher in the technology department at Bodley High, says the challenge of attracting more girls to classes that involve the use of technology is not unique to her school or state.

"This is an issue for people who I have talked to all over the country," she says. "It is one of those constant struggles to make sure you produce a program that is gender-fair. You are battling so many societal issues."

Barriers that limit young women from having the information and opportunities to explore technology-rich classes need to be lifted.

Fifteen years ago, Matteson was among only a handful of women enrolled as technology education majors at the State University of New York at Oswego. "It wasn't much better when my daughter graduated three years ago," Matteson says. "Things haven't improved a whole lot."

Marcia Greenberger, a co-president of the National Women's Law Center, a Washington-based advocacy organization, says that school systems have lagged behind the business world when it comes to creating an equal-opportunity environment. The law center, which works to advance girls in school and women in the workplace, has started a public-information campaign that takes aim at gender stereotyping and discrimination in career and technical programs.

"Women and girls are not getting the education they need to prepare them for high-wage careers in areas such as computers and engineering," Greenberger contends. "Even with all the advancements for women, many job-training and career programs are still segregated by sex, with female students in classes such as cosmetology and typing, that lead to traditionally female, low-wage careers."

'Subtle Biases'

Other groups are pushing a high-tech agenda for girls, too.

Last year, the Washington-based American Association of University Women released a report, "Tech-Savvy: Educating Girls in the New Computer Age," that says schools need to do a better job of teaching and applying information technology, particularly as it relates to girls.

"Girls are an untapped source of talent to lead the high-tech economy and culture," the report argues. Teachers and those who write curricula, it continues, "need to cultivate girls' interest by infusing technology concepts and uses into subject areas ranging from music to history to the sciences in order to interest a broader array of learners."

And women's groups say efforts need to be made to get girls interested in technical careers while they're in high school.

The Cisco Networking Academy Program--which teaches students to design, build, and maintain computer systems and is taught in schools across the country--has made recruiting and retaining women for its program a high priority. Among other projects, Cisco has asked the Institute for Women in Trades, Technology, and Science, an organization that works to encourage women to enter fields such as technology, to review Cisco programs to find better ways to attract girls and women into technology.

An informal survey conducted by Cisco officials found a ratio of roughly 5-to-1 of males to females in its academy programs.

"We believe there is a real need to encourage young women," says Erin Walsh, the manager for international strategies and partnerships at Cisco. "Technology is a terrific career choice."

Gender Equity Loses Steam

A 1998 update of the federal law that helps pay for state vocational education programs eliminated a separate funding source that the initial law had earmarked for nontraditional populations and efforts to eliminate sex bias and stereotypes in vocational education, the curriculum umbrella that covers many school technology classes. Under the old version of the law, states were required to have gender-equity coordinators to make sure relatively equal numbers of girls and boys were benefiting from such classes.

But today, although states still have the option of funding such positions, they are not required to do so. Congress also set a cap on how much set-aside money states can spend on programs for special populations, such as clubs for girls interested in technology.

Training teachers and guidance counselors to be sensitive to gender issues is critical to improving technology education programs.

"This is a touchy issue, and a lot of states don't want to deal with it," says Mimi Lufkin, the executive director of the Cochranville, Pa.-based National Alliance for Partnerships in Equity, Inc., or NAPE, which promotes gender equity in education. "Teachers can be defensive if someone comes in and says, 'You are not doing this right.' "

Training teachers and guidance counselors to be sensitive to gender issues, Lufkin argues, is critical in improving the environment for vocational and technology education programs. Currently, only four states out of 36 that responded to a NAPE survey reported that they had a full-time employee devoted to gender equity.

'Different Preferences'

Other experts, meanwhile, question the premises of much of the discussion of girls and technology.

Judith S. Kleinfeld, a professor of psychology at the University of Alaska, Fairbanks, argues that what many advocates and teachers see as a disturbing "gender gap" in technology is really a natural process of students choosing to pursue different interests.

In general, she says, research shows that women prefer activities that involve working with other people, and men have more of an interest in working with "things"--including computers. Talking about a gender gap, she says, makes it seem that girls somehow aren't doing as well as boys.

Encouraging girls to pursue courses oriented toward technology can be positive, but pressuring girls into technology-related careers when their interest lies with teaching or nursing, she cautions, is wrong and makes young women feel that such careers are less worthy.

"As long as we have a society in which males and females are free to make choices, they are going to make choices," Kleinfeld says. "Males and females have different preferences."

On The Web

Read an executive summary of "Tech-Savvy: Educating Girls in the New Computer Age (2000)," a report from the American Association of University Women. Further research on math, science, and technology model programs for girls is also available.

The Institute for Women in Trades, Technology & Science has posted information on Cisco's Gender Initiative, a collaboration with Cisco Systems Inc. to "increase the number of female students in Cisco Networking Academy Programs (CNAPs) in secondary schools and two and four-year colleges across the US and internationally." The institute also provides detailed information on its Women Tech Project.

"Opening the Door to Economic Security: Making Career Education Programs Work for Women and Girls," March 2001, from the National Women's Law Center, addresses gender stereotyping and female discrimination in career and technical programs. (Requires Adobe's Acrobat Reader.)

PHOTOS: Across the country, technology-related classes, such as this one at South Burlington High School in Vermont, serve mostly boys. Last year, only 15 percent of those taking the Advanced Placement exam for computer science were girls. Between 1984 and 1998, the percentage of women receiving undergraduate degrees in computer science dropped from 37 percent to 27 percent.
--Allison Shelley

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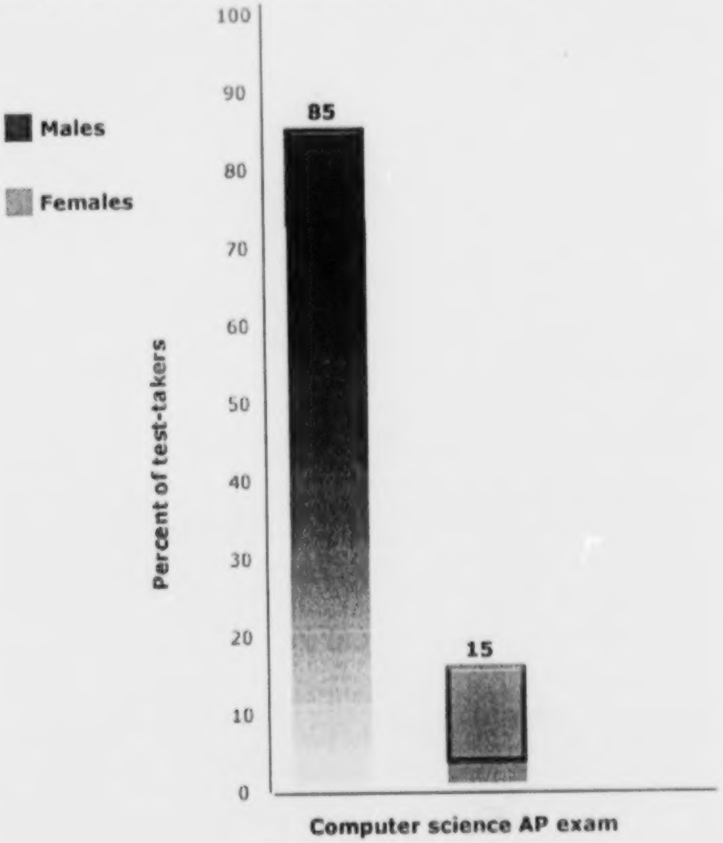
TECHNOLOGY COUNTS 2001

The New Divides

THE ISSUES

Gender 'Tech-Equity'

☐ Of the nearly 20,000 students who took the Advanced Placement (AP) computer science exam in 2000, only a small percent of test-takers were female.



☐ SOURCE: The College Board, 2000

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"Teacher How E-Learning Will Transform Education," Commentary, Sept. 13, 2000.

"Administrators Say Technology Calls For Range of Skills," Nov. 29, 2000.

"Remedial Courses Perform Important Service, Report Concludes," Nov. 25, 1998.

THE ISSUES

May 10, 2001

Academic Record

By Kathleen Kennedy Manzo

Students in Tim Comolli's electronic-arts class at South Burlington High School have won awards for their 3-D graphic designs; they've sold computer-generated logos to businesses in their South Burlington, Vt., community; and they've taught teachers how to use Internet search engines and sophisticated multimedia software.

Yet many of the students who are drawn to Comolli's class are teenagers who are struggling in most of their other classes. Once they see what they can do with technology, they begin to appreciate the importance of doing well not only in his class, but in their other subjects as well, Comolli says. "We've found that technology becomes the great equalizer [for struggling students]," says the English teacher, who began offering the course three years ago. "Kids who are having trouble in school have as good a success rate in my class as the advanced students, even more so."

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Untapped Potential

Many researchers agree that well-designed educational software--combined with innovative instruction and aligned with the curriculum--can help raise the achievement of students who have struggled in the traditional classroom.

Charts

Low Achievers Lose Out

But too many students, they say, have been left on the wrong side of the digital divide because teachers haven't quite figured out how to use technology effectively with low achievers in ways that bolster academic learning.

"Computers are often used as a reward for the good kids," says Margaret Honey, the director of the Center for Children and Technology in New York City. "You get your work done and you get to work on the computer as a treat. Teachers often use technology as an enrichment activity."

And, she says, that widens the divide between high achievers and low achievers because it is usually the better-performing or more motivated students who get the rewards.

What's more, recent research confirms that meaningful technology experiences often elude academically struggling students.

According to the 1998 "Teaching, Learning, and Computing" survey of teachers and schools by the Center for Research on Information Technology and Organizations at the University of California, Irvine, teachers of low-achieving classes use substantially more skills-based software, while teachers of advanced students use a mix of more sophisticated programs.

Two studies--conducted in the late 1990s by Janet Ward Schofield and Ann Locke Davidson of the University of Pittsburgh--found that "low-performing students tended to have far less access to computers than higher-achieving students."

Similar to what Honey has found, the Pittsburgh researchers concluded that many teachers used computers, and particularly the Internet, as a reward for good performance in the classroom.

Too many students have been left on the wrong side of the digital divide because teachers haven't quite figured out how to use technology effectively with low achievers.

"Teachers ... tend to see Internet access as an optional privilege rather than as a basic resource, such as textbooks or library materials, to which all students should have access," according to their 1998 study, "The Internet and Equality of Educational Opportunity."

Teachers also tend to have far different expectations for how technology can be used for high achievers and low achievers. The "Teaching, Learning, and Computing" survey, for instance, noted that teachers generally believe that struggling students are less likely than their higher-achieving classmates to have successful experiences with technology. Moreover, devising methods for using complex software with lower-achieving students takes time and practice, which for many teachers means stealing attention away from covering important academic content.

Another reason that low achievers are losing out, says Anthony S. Bryk, an education professor at the University of Chicago, is that technology is introduced as a remedial tool. And he says that is especially so in poor urban schools.

Under those circumstances, computers are used primarily to boost students' basic academic skills--not in ways that allow youngsters to delve deeply into a topic or examine a problem in a more sophisticated or original way.

"In those cases," says Bryk, "nobody is creating a vision for how technology can be used to improve student performance."

But some schools are making headway with the help of organizations like the Center for Children and Technology.

The center has provided laptop computers and lessons in high-level applications to 9th graders in Union City, N.J., who have been identified as at risk of performing poorly in school. The 40 students selected for the project agreed to certain responsibilities, such as improving their school attendance, raising their grades, and teaching others to use the technology.

In the three years since the project started, Honey reports, many of the students have made dramatic academic improvement, moving, for example, out of remedial classes--or, in several cases, from general education classes into honors programs.

Beyond Basics

Nevertheless, in most places, the general application of technology with low-achieving students is for "drill and practice" in academic skills.

Such uses of technology "may boost motivation in the short term--but, in the long run, worksheets are worksheets," quips Christopher J. Dede, co-director of the Technology in Education Program at Harvard University.

Plenty of evidence, Dede says, suggests that students can learn basic academic skills while engaged in more complex tasks.

Dede argues that research "has demonstrated convincingly that if kids are involved in problems that are sophisticated, and they find they don't have a basic skill to get to the sophisticated stuff, they are very motivated to learn the basic stuff."

Students in an inner-city Boston high school with minimal math and science skills, for instance, were able to demonstrate a deep understanding of Einstein's Theory of Relativity and answer complicated genetics questions using sophisticated computer programs that modeled real-world problems.

Their skills, in fact, were on a par with those of their peers in an affluent suburban school, according to research by Paul Horowitz, a senior research associate at the Concord Consortium, a research organization in Concord, Mass., that promotes educational improvement through technology.

The hands-on software programs, Horowitz says, can teach students basic science skills by having them actually do science, rather than trying to have them visualize the scientific concepts presented in textbooks.

"In a very important sense, both math and science are games, but their game-like nature doesn't come out in problems in a textbook," Horowitz says. "The computer can help create fantasy worlds. It's like the real world of a scientist, but it's simplified to the point where students can master [concepts] and figure out the rules of science."

On The Web

Review the findings of the "Teaching, Learning, and Computing," survey, July 2000, conducted by the Center for Research on Information Technology and Organizations (CRITO). The survey was undertaken to find out whether "computers, as a medium of instruction and as a tool for student learning, are largely incompatible with the requirements of teaching." (Requires Adobe's Acrobat Reader.) Resources and information on the 1998 Teaching, Learning, and Computing survey are also available.

"The Internet and Equality of Educational Opportunity," a report from the Learning Research and Development Center at the University of Pittsburgh, examines children's access to technology in schools and whether it mirrors existing inequalities.

Center for Children in Technology posts a complete list of its research projects since 1980.

"Wired Schools: A Technology Revolution Is About To Sweep America's Classrooms," a special report from *Business Week* , details how technological innovation helped transform chronically low-achieving schools in Union City, N.J.

PHOTOS: Tim Comolli, an English teacher at South Burlington High School, designed an electronic arts class in which students learn how to use sophisticated computer animation programs. Some researchers say unmotivated or academically struggling students tend to have less access to quality technology learning than their more motivated or gifted peers. But Comolli says, in his electronic arts class, it's hard to tell the difference between high and low achievers.
--Allison Shelley

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THERE'S MORE THAN ONE DIGITAL DIVIDE

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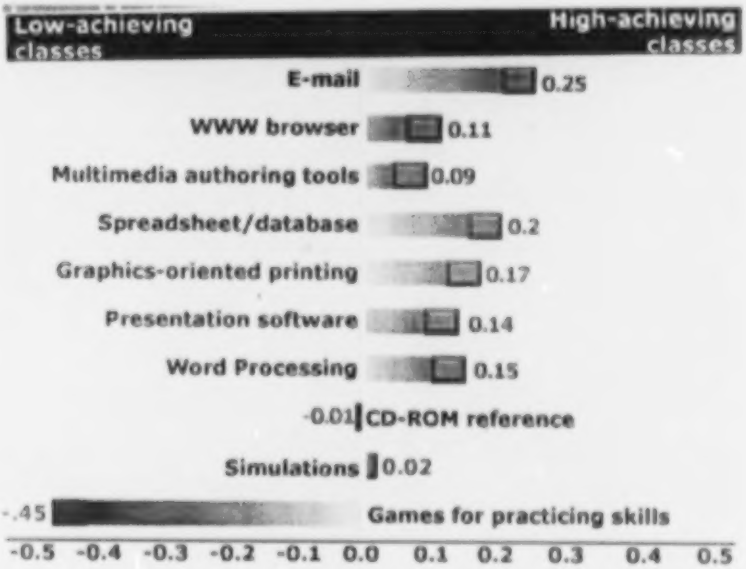
THE ISSUES

Low Achievers Lose Out

☐ Among teachers who use computers in the classroom, teachers of high- achieving classes are more likely to use complex applications such as graphics and presentation software, while teachers of low-achieving classes often use computers for more narrowly focused, drill-and- practice exercises.



☐ NOTE: Scores are the standard deviations between the levels of use in low-achieving and high-achieving classes. Positive differences indicate greater use by teachers of high-achieving classes. Negative differences indicate greater use by teachers of low-achieving classes.

SOURCE: Center for Research on Information Technology and Organizations, University of California, Irvine, "Snapshot#8" from the Teaching, Learning, and Computing, 1998 National Survey

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May 10, 2001

Rural Connections

By Mary Ann Zehr

In a remote area of New Mexico, Central Consolidated Schools is struggling to get a workable connection to the Internet for all its schools.

The 7,500-student district with 17 schools straddles a Navajo reservation. The district's five schools that are not on the American Indian reservation, plus one that is, have a fast and robust connection to the Internet. But 11 of the schools on the reservation have a lousy connection, so slow that it can take half an hour to download a few e-mail messages.

"Not only is there a digital divide, but we live on it," says Rick Nussbaum, the director of technology-support services for the district.

The reason, he points out, is that the district hasn't been able to get the telecommunications company serving the area to install the line that would permit the schools on the reservation to share the fast connection to the Internet--a T1 line--that the schools off the reservation are using.

"We have the hardware, the servers, the routers," says Nussbaum. "We have the connections between schools. The only problem we're having is getting connected to the Internet."

The 'Last Mile' Problem

Rural and other isolated areas hoping to link up with advanced telecommunications often encounter what technology experts call the "last mile" problem.

It's costly for companies to lay fiber-optic cable or provide another kind of technology infrastructure in remote areas both because of the distances involved and because local communities often lack the customer base that suburban or urban areas have that enable providers to recoup their costs.

"The issue becomes the level of access--how big your pipe is coming into your school," says Steven A. Sanchez, the director of curriculum, instruction and learning technologies for the New Mexico Department of Education. "It's those isolated communities in the mountain areas and out on the reservations that have had the most difficulty" with access.

Education technology experts generally talk as if all students are entitled to "broadband" access to the Internet, which is generally viewed as a connection able to transmit large amounts of video and data in two directions. The goal of most educators is to obtain at least

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Related *Education Week* stories:

"Leveraging the E-rate's Power," from our special report *Global Connections, Local Static: Gauging the E-rate's Impact* , Sept. 20, 2000.

"Ten States Seen as Topping Rural Education Priority List," Sept. 13, 2001.

"Rural Youths Share Efforts To Keep Home Fires Burning," April 12, 2001.

"Poorer Schools Still Lagging Behind on Internet Access, Study Finds," Feb. 23, 2000.

"Advocates Push Plan for Rural-District Grant," Feb. 24, 1999.

the quality of a T1 line for rural schools, even though some suburban or urban schools now have even higher-quality connections.

Almost all of the nation's schools have, at the least, what's called a "dial-up" connection to the Internet, which allows students or teachers to place a call to the Internet service provider in the same way they would place a regular telephone call.

In many rural communities, few students have computers and Internet connections at home.

With the help of state initiatives that take advantage of bulk buying power to convince companies it's worth their while to provide an infrastructure for service to far-flung areas, and with the help of satellite and other technologies, many rural areas are overcoming access problems.

Kentucky, for example, has a statewide initiative that guarantees broadband access to every county in the state, and many schools have been successful in getting high-quality connections, according to Marty Newell, a part-time field-staff person for the Rural School and Community Trust, a Washington-based nonprofit organization.

In addition, while many of the federal Bureau of Indian Affairs' 185 schools have had only slow dial-up connections to the Internet, the government expected, as of April, to have every BIA school connected to the Internet with at least a T1-quality line. The project used satellite technology in areas where it wasn't feasible to lay fiber-optic cable that would provide a T1 line or fractional T1 line, which would provide a school with only a fraction of the 24 channels available with a full T1 line.

"If we had known how difficult it was, we never would have started," says Peter H. Camp, an education specialist for the BIA and a member of the team that coordinated the effort, which took three years. "It has been an enormous challenge."

Home Connections Scarce

But some rural schools are still waiting to get T1-quality lines.

Those schools may not have gotten around to applying for federal E-rate money, which subsidizes such connections, benefiting many rural schools.

Or the schools with poor access may not yet have experienced the fruits of state initiatives that are kicking in right now. The North Dakota legislature, for example, has approved plans for a network that ensures that all districts with a high school will have T1 connections by the end of this summer.

One reason to target rural schools for high-quality connections to the Internet is that in many rural communities, few students have computers and Internet connections at home.

"I'm working in a lot of places where more than a third of the homes don't have telephones," notes Newell of the Rural School and Community Trust, who has worked with nearly two dozen rural schools in Georgia, Kentucky, North Carolina, Tennessee, and Virginia over the past year. "We're a long way from having computers in those homes."

At large schools, having a poor connection rules out certain educational activities.

Debra L. Flynn, the sole teacher at Molt Elementary School in Molt, Mont., says that only one of the nine students in her school has a computer at home and the school's Internet connection is often used by members of the community.

A dial-up connection to the Internet has been workable for her students, given the small size of the school. Still, Flynn has appreciated upgrades to the connection.

A year ago, the school used E-rate aid to pay for a second telephone line, which is now dedicated to Internet access. The second line makes computer troubleshooting much easier, says Flynn, because she can stay on the phone with a repair person at the same time she's logged on to the Internet.

While at a tiny school such as Molt Elementary, students may not be losing out in big ways by not having a state-of-the-art connection to the Internet, at schools with more students--and thus more traffic--having a poor connection rules out certain educational activities.

Information Flows in Digital Drips

Stephen Carr, a technology teacher at Newcomb Middle School, one of the schools within New Mexico's Central Consolidated district, says the quality of the connection to the Internet at his 250-student school on the Navajo reservation is like "a small water pipe." He says: "We're getting drips, while everyone else is getting a flow."

Newcomb and nine other schools on the reservation share one 56K dedicated line to the Internet.

Besides the fact that students have to wait while Web pages load "painfully" slowly, Carr says, the quality of the connection doesn't allow them to participate in online courses, which can be an important source of instruction for rural students.

"We have [high school] students who leave here at about 7:30 in the morning to go to San Juan College in Farmington, 75 miles away. They're able to take one class in the morning and come back to the school to take classes in the afternoon," Carr says. "If we had Internet access and a higher bandwidth and satellite communication, we could set up two-way communication for a class."

On The Web

"The E-Rate in America: A Tale of Four Cities", a collaborative report by the Center for Children in Technology and the Benton Foundation, is an in-depth study of the federal program designed to help wire schools and libraries to the Internet. (Requires Adobe's Acrobat Reader.) The CCT has also posted a complete list of its research projects carried out since 1980.

Read "Why Rural Matters: The Need for Every State to Take Action on Rural Education," a report on the context of rural education in the 50 states, from the Rural Schools and Community Trust.

"Distance Learning Moves to the Head of the Class," an article from *Communications, Engineering and Design Magazine* , looks at the effect of distance-learning oppurtunities created by the Internet.

PHOTOS: Because poor Internet connections prevent them from taking classes online, some high school students from New Mexico's remote Central Consolidated Schools must ride a bus 75 miles to a college in Farmington, N.M.,to take courses that are not offered in their district.
--Marc Henning

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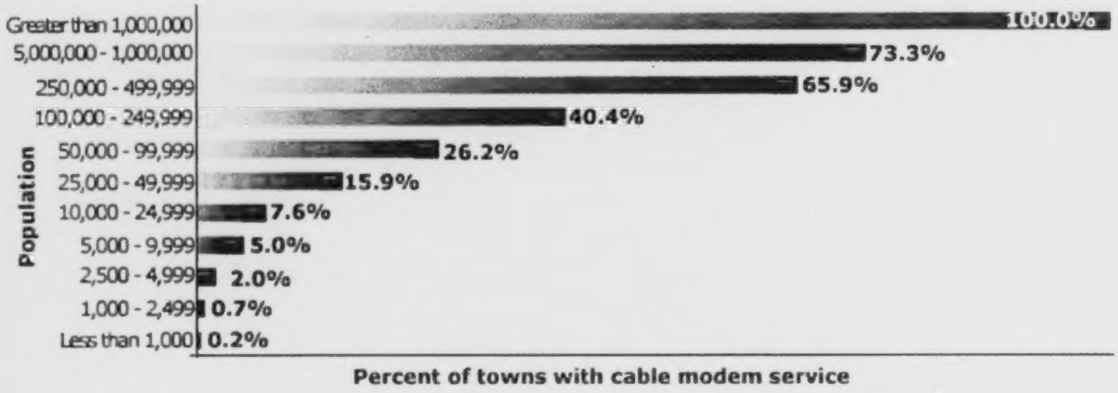
Bigger Means Better Access

☐ The availability of cable modem service, one method of providing broadband, could depend on the size of the town. An analysis by the National Telecommunications and Information Administration shows that while cable modem service was available in some portion of all large cities with more than 1 million residents, service was available to less than 1 percent of the nearly 15,000 towns with populations of fewer than 2,500 people.



☐ SOURCE: National Telecommunications and Information Administration, "Advanced Telecommunications in Rural America," 2000. An analysis of data from CED Magazine, "Cable Modem Deployment Update," March, 2000, and U.S. Census Bureau, Census Gazetteer, 1990

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May 10, 2001

Special-Needs Gaps

By Lisa Fine

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When the topic of the digital divide arises, R. Craig Wood often asks school administrators and teachers to picture what it would be like to surf the Internet with their monitors turned off or without using a computer mouse.

Wood, a Charlottesville, Va., lawyer who has advised national groups about the role of technology in teaching children with disabilities, says many schools that have Web sites have failed to make them accessible to such students. Students with visual impairments and conditions that restrict physical movement face some of the biggest challenges. Schools whose Web sites don't accommodate children with disabilities are opening themselves up to potential lawsuits for violating the Americans with Disabilities Act, warns Wood.

The lawyer echoes what special education administrators and advocates say: Many people think of the digital divide as being between those who have access to technology and those who don't. But for the 5 million U.S. students receiving special education services, simply having access to technology doesn't guarantee they will be able to use it.

Bill East, the executive director of the National Association of State Directors of Special Education, says school administrators have to be more rigorous in evaluating how technology is used for students with disabilities.

"The problems of the haves and the have-nots are just magnified when we talk about disability," East says. "Technology can be a great equalizer, but when the playing field is not leveled, students with disabilities will have even greater problems."

East says states must work hard to close that gap. When education officials deal with technology grants and programs, he says, they must always consider the needs of such students.

"They should not be an afterthought," he says.

Barriers to Access

People with disabilities have encountered a number of barriers in technology, such as inaccessible Web sites and software that is incompatible with adaptive devices employed by the disabled to use computers and other technologies, according to a 1999 report by the U.S. Department of Commerce, "Understanding the Digital Economy."

Related *Education Week* stories:

"Spec. Ed. Costs Can Be Taxing for Districts," March 14, 2001.

"More Disabled Students Graduating, Ed. Dept. Report Says," Dec. 6, 2000.

"States Report Trouble With Special Ed. Testing," March 15, 2000.

"Suit Says Ore. Test Unfair to Learning-Disabled," March 3, 1999.

For the 5 million U.S. students receiving special education services, simply having access to technology doesn't guarantee they will be able to use it.

As a consequence, schools should be especially sensitive to what levels of accessibility exist inside individual classrooms and whether that access is being used wisely, advocates for students with disabilities say.

At the least, East says, teacher training should offer guidance in how technologies can be used by students with disabilities to enhance their learning.

Some school districts are already making use of technology to help equalize the educational opportunities for students with disabilities.

For instance, in some places, word processors with "word prediction" software--in which programs complete unfinished words or check the spelling of words as they're being typed--are helping children who have disabilities that affect language and writing in doing such tasks as taking notes.

For students who have problems with upper-body coordination or cannot use their arms, computers can be outfitted with a foot pedal that acts like a computer mouse.

And, for visually impaired children, screen magnifiers used in some places help youngsters see images and text more easily.

In addition to those devices, speech synthesizers that translate complicated chemical and mathematical equations are available for blind students; and computers that translate Braille into English make it easier for general education teachers to grade the work of a blind student.

Electronic Portfolios

Indiana has used technology to design an alternative assessment for students with disabilities that allows them to better express their abilities.

In partnership with Purdue University, the state department of education devised electronic "portfolios" for such students. As part of the program, laptop computers are loaded with special assessment software to collect and document a student's work and performance. A video camera records the student's activities and answers; in turn, those recordings are downloaded into his or her portfolio.

The equipment allows teachers to record student performance whenever they need to over the course of the school year.

"We view the electronic portfolio as one more tool to better assess what students with disabilities have learned and are able to do," says Suellen Reed, Indiana's superintendent of public instruction. "What we have seen is that the potential achievement of special education students has been underestimated."

An Indiana program uses technology to provide an alternative assessment that allows students with disabilities to better express their abilities.

The software is programmed to assess more than 1,000 skills, including those in mathematics, science, and language. The state developed the assessment software, but each district is responsible for buying the appropriate hardware.

In addition, on its standardized tests, Indiana allows the use of word processors and electronic calculators for some students with disabilities who ask for those accommodations.

Brenda Welburn, the director of the National Association of State Boards of Education, says states should try more creative approaches, such as Indiana's, to assess the achievement of students with disabilities.

"Given the national effort to make our schools more accountable, and the critical importance of leaving no child behind as we move forward, it is imperative that we seek innovative and alternative means of assessing students with disabilities," Welburn says. "We want to shine a light on the creative approach being used by Indiana with the hope that other states will consider equally innovative approaches and partnerships."

Michael Huffman, the special assistant for technology for the Indiana Department of Education, says the state's K-12 schools have universal Internet access, but the state wants to gather better information to evaluate what level of access schools are offering students with disabilities. Next year, an annual survey that tracks technology use in schools will include for the first time a specific category on access for those students.

"We will be able to have a better idea of the situation for our students with disabilities when the survey is done," Huffman says. "We have made great strides. But we still have a long way to go."

Technology and Testing

As more states require students to pass state tests to graduate or be promoted to the next grade, technology could help level the playing field in measuring the performance of students with disabilities.

For example, a recent settlement of a lawsuit in Oregon requires that students with learning disabilities be allowed to use spell-check software, dictation machines, and other forms of help deemed appropriate on a case-by-case basis to take statewide tests.

The settlement, reached Feb. 1, stems from a 1999 lawsuit filed against the state board of education by a group of parents who claimed that the standardized tests violated the Americans with Disabilities Act. When designing the assessment system, first used in the 1998-99 school year, the board did not take into account the needs of Oregon students with dyslexia, attention deficit disorder, and other learning disabilities, according to the suit.

> Technology could help level the playing field in measuring the performance of students with disabilities.

In the complaint, the parents of five children argued that it was unfair that their children had been accommodated in classroom work, but were not allowed the same assistance on state exams, which are given in grades 3, 5, 8, and 10. Students who fail the tests can be held back a grade and be forced to go to summer school.

"Our hope is that [the case] will have a huge impact on high-stakes testing," says Alison Aubry, a lawyer with Disability Rights Advocates, a public-interest law center in Oakland, Calif., that represented the parents in the Oregon case. "Because of this settlement, Oregon will be setting up a model system that other states will pay attention to.

"A lot of states are trying to figure out how students with disabilities fit into high-stakes testing."

On The Web

The U.S. Justice Department provides a host of resources on the Americans With Disabilities Act, including regulations and technical assistance materials.

The National Association of State Directors of Special Education offers information on its professional development program in assistive technology.

"Do No Harm," a report from the Disability Rights Advocates, addresses "the needs and rights of students with learning disabilities with regard to high-stakes standardized tests." (Requires Adobe's Acrobat Reader.)

A 1997 policy brief from the National Association of State Boards of Education notes that "a key issue for policymakers as they enact tougher requirements for the diploma is how to include students with disabilities." (Requires Adobe's Acrobat Reader.)

Read the text of the negotiated settlement between the Advocates for Special Kids and the Oregon Department of Education, reprinted by the Oregon Department of Education. The department also posts a report by a panel of experts convened to review the Oregon Statewide Assessment System as it relates to students with learning disabilities. (Both documents require Adobe's Acrobat Reader.)

PHOTOS: At Westlane Middle School in Indianapolis, teacher Annemarie Cramer videotapes Holly Mantsch for the youngster's digital portfolio, a computerized record of what she has learned. Indiana recently started using electronic portfolios to assess the academic skills of special-needs students. Bill East, the executive director of the National Association of State Directors of Special Education, says "the problems of the haves and the have-nots are just magnified when we talk about disability.
--Tom Strickland

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May 10, 2001

Language Barriers

By Mary Ann Zehr

When the first class went to the computer lab, it got what J. David Ramirez considers a "really great" lesson. The students were working in teams and taking full advantage of the computers' research and graphic capabilities.

Ramirez, a researcher at California State University-Long Beach, was at the middle school in the spring of last year as part of a team evaluating an urban district in California. When he found out that some limited-English-proficient students were scheduled to use the lab later that day, he returned to observe their lesson and see how it compared.

"It was the same teacher and lab," he says, "but this group of kids were doing drill sheets on the computer. When I asked the teacher why there was a difference in the activities, she said, 'Well, these kids don't speak English.'"

Not Enough Training

Experts say it's not uncommon for LEP students, also called English-language learners, to get the short end of the stick when it comes to technology. Even when they're lucky enough to get as much time on school computers as their English-proficient classmates, they tend to use it in less meaningful ways.

One reason is that for LEP students to get the most out of technology, they need teachers who are trained both to help them learn English and to use computers effectively in instruction. Unfortunately, that's a rare combination.

> LEP students need teachers who are trained both to help them learn English and to use computers effectively in instruction. Unfortunately, that's a rare combination.

Ramirez notes that out of 600 teachers trained to use technology as part of a "telementoring" project funded by the California legislature in the mid-1990s, only a handful were bilingual education or English-as-a-second-language teachers. One reason was that the project required a minimum level of technology skills for admission to the program, and most of the teachers who worked with LEP students lacked even that, he says. And based on what he's seen recently, Ramirez believes the situation hasn't improved much since then.

Deborah Healey, who trains teachers who work with LEP students at Oregon State University in Corvallis, adds that many ESL teachers and bilingual assistants are hired to work a fixed amount of hours and aren't eligible for release time for in-service training. "There aren't any school districts who tell them not to go [to in-service training], but they don't pay them or give them the time off," she says.

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"Learning Gap Linked to LEP Instruction," April 25, 2001.

"Study: Dearth of Programs for Older Immigrant Students," Jan. 24, 2001.

"Un Día Nuevo for Schools," Nov. 8, 2000, from our special series *2000 & Beyond: The Changing Face of American Schools* .

Some schools expect that students with limited English skills will gain access to technology when they spend time in mainstream classrooms. But if the teachers of those classes aren't trained in overcoming language and cultural barriers in their lessons, Healey points out, that access may not be very meaningful. "When you have teachers who are not trained to work with [LEP students]," she says, "they don't know what in the world to do with the kids."

A lack of qualified teachers can limit the effectiveness of federal funding spent on computers, notes Jane E. Lopez, a lawyer for Multicultural Education, Training, and Advocacy Inc., a nonprofit organization in Boston that monitors services to LEP students there as part of a federal consent decree. She says those students haven't benefited much from many of the computer labs that were paid for with money under Title I of the Elementary and Secondary Education Act.

"What we found is there was very little use by the LEP students of computer labs, either because the [bilingual or ESL] teacher didn't take them, or their schedule was full, or there wasn't a bilingual person to assist the students in the lab," Lopez says. "When schools put money into these labs and say, 'All kids benefit,' that's not necessarily the case."

'The Last Space Available'

Often, bilingual education and ESL programs lack equipment to work with in the first place. They tend to be poorly funded and operate on the periphery of schools, where they're less likely to receive computers than mainstream classrooms.

"ESL teachers go into a school and they're allocated the last space available, and even though it's not legal, they'll be working out of closets or in groups that are much too large, or they won't have the 30 minutes a day they should have to be working with students," says Judie Hayes, an ESL teacher at the 450-student Cherry Hill elementary school in River Edge, N.J., who runs a Web site to support ESL teachers. "How can you have a computer if you're working in a hallway?"

Another problem is the lack of high-quality software and Web sites designed for English-language learners. "I don't have any gripes with my school," says Colleen Hetherington, an ESL teacher at the 360-student Center Junior High School in Center, Texas. "My gripes are with the industry. I think they've ignored us."

Hetherington is unusual because she is experienced in teaching students with computers and is also certified to teach English as a second language. She was a full-time computer teacher for nine years before becoming a full-time ESL teacher. Through grants and other means, Hetherington has obtained 11 computers for her classroom while most teachers in her school have only one or two computers.

LEP programs tend to be poorly funded and operate on the periphery of schools, where they're less likely to receive computers.

But it's been hard to find software that is meaningful for her students, she says, adding that what is available requires a lot of adaptations. Moreover, Hetherington says, it's hard to find software that is sequenced in a way that corresponds with how students learn English as a second language.

"A lot of programs don't have enough controlled use of the vocabulary," she says. "All of a sudden, they start giving instructions in vocabulary that the students don't know."

The Software 'Abyss'

Ellen Wolock, the managing editor of *Children's Software Revue* , in Flemington, N.J., agrees that the software industry has produced little for LEP students. "It's a real hole," she says. "It's silly that there's that much of an abyss."

But an industry expert notes that companies have to look after the bottom line. "Their best bet is to focus on the mainstream, where the largest market is," observes Mark Schneiderman, the director of federal education policy for the Washington-based Software & Information Industry Association.

Subtler issues, such as academic performance and behavior, can also influence how much access LEP students have to technology and how they use it. In some cases, those factors can create inequalities even between LEP students attending the same school.

For example, Hersholt C. Waxman, a professor of curriculum and instruction at the University of Houston, and two co-researchers found in a recent study of three Texas elementary schools that higher-achieving LEP students used computers more often and for more meaningful activities than lower- achieving LEP students did. Most students in all three schools come from economically disadvantaged backgrounds.

Lower-achieving LEP students tended to use computers only after finishing all their other classroom work--and most often for games--while their higher-achieving counterparts used computers more often in classrooms and most often for word processing and other educational purposes, the researchers found.

Expectations Differ

James L. Radomski, an English teacher at the 4,400-student Huntington Park High School in the Los Angeles area, says that the discipline level of his classes also affects students' access to technology.

He's taken his "sheltered" class of students with limited English skills to the computer lab only five times this year, while he's taken his mainstream classesó which include native speakers of English as well as some higher-level LEP students and former LEP students--10 to 15 times.

> Academic performance and behavior can also influence how much access LEP students have to technology and how they use it.

The LEP class of 35 students in 10th grade has many teenagers who recently arrived from other countries and tend to behave well, Radomski says, but it also includes what he calls "hard core" students who may have been born in the United States but still aren't fluent in English. Some of the long-term LEP students are turned off by school and often disrupt class, Radomski says.

Unfortunately, he says, he believes he can manage the students better in a classroom than in a computer lab. "I'd be the first to say that I didn't use the computers as much because of their behavior," he says.

When Radomski does take the sheltered LEP class to the lab, he says, he either has the students do simple word processing or Internet research that involves highly prescribed steps.

"I could carry them further, ... having them do more in-depth Internet assignments, using my home page as a starting point, and using dictionaries as resources," he says. But, he adds: "They don't get there."

On The Web

In collaboration with the U.S. Department of Education, Sam Houston State University in Huntsville, Tex., offers a degree program called TecBEATT, or Technology for Bilingual Educators as Teachers and Trainers. Information about the program is provided in these FAQ's.

"Electronic Text and English as Second Language Environments," a paper from the Center on English Language and Achievement, finds that teachers are starting to use technology to enhance ESL teaching and examines the implications.

"Technology for High Needs Students," from the Tomas Rivera Policy Institute's Digital Steppingstones project, looks at the integration of technology in a mostly hispanic school serving a large percentage of LEP students.

PHOTOS: Teacher Colleen Hetherington works with students at Center Junior High School in Center, Texas. Hetherington is unusual in that she is technologically savvy and also certified to teach English as a Second Language.
--Andrew D. Brosig

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Beyond Machines

By Kevin Bushweller

Pittsburgh

To appreciate how wide the digital divide can stretch, you need only wander into teacher Bob Vukela's computer-applications and business lab at Oliver High School here. You'll find a dozen students tapping the clunky keyboards connected to Tandy 1000s, computers that are older than most of the teenagers in the room. All the printers are broken, nothing but plastic and metal junk, because the parts to repair them are no longer manufactured. And the signature floppy disks students plug into the Tandy machines are like artifacts from an age of computing long since gone.

On this morning, Mark Abbott, a 15-year-old with a cap of bleached blond hair and an earring decorating his left eyebrow, is in the lab with other students, typing assignments into the obsolete machines. He raises his eyebrows and smiles sardonically when asked about the quality of the computers. "These things are garbage," he pronounces.

Vukela, a gray-bearded, bespectacled 57-year-old who plans to retire this June after 35 years of teaching, eyes the students working in the lab and concedes: "They're making the best of a bad situation."

Unfortunately, Vukela says, his is not the only computer lab in the Pittsburgh city schools sporting grossly obsolete machines. Other labs are also 15 or more years behind the times--footnotes to the so-called digital divide, a phrase popularized by the Clinton administration to express the wide disparities in access to current technologies, largely between rich and poor. Nowadays, though, some digital-learning advocates say the phrase is so overused it has almost become a cliche, blurring the underlying threat of what the digital divide really means for communities like Pittsburgh--namely, that the technology skills and knowledge of thousands of city children will fall way behind their peers in wealthier communities.

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"Troubled Pa. Districts Eye Dramatic Changes," Nov. 22, 2000.

"Pa. Targets 11 Districts for Takeover," May 17, 2000.

"Poorer Schools Still Lagging Behind on Internet Access, Study Finds," Feb. 23, 2000.

> In Steel City, schools are grappling with the human and technical nuances of the digital divide.

The good news in Steel City is that the Tandy 1000s are fading from the educational landscape. With help from the federal E-rate program, which offers discounts to needy schools to buy telecommunications technology, the Pittsburgh school district has invested $24 million in hardware and software upgrades over the past three years. Vukela's lab, for one, is scheduled for an upgrade in September. As it is, there are roughly 10,000 modern computers in the 39,000-student district--a computer-to-student ratio that is actually slightly better than the average national ratio of 1-to-5.

Just a few doors down from Vukela's lab, in fact, business teacher Carolyn Flavin shows students in a computer-applications class, who are using state-of-the-art Dell computers, how to use Microsoft Word to create title and content pages for research papers. On any given day at Oliver High, you might also find some of the school's 1,250 students analyzing the credibility of Web pages--or working through algebra word problems using software that tailors questions to students' individual skill levels and provides immediate feedback on their answers.

The bad news, however, is that the Pittsburgh school system--like many other districts across the country--has largely ignored the human factors necessary to close the digital divide. So, you'll see "pockets of excellence" scattered around the district, but not widespread use of technology in education, says Glenn Ponas, a former high school mathematics teacher who is now the district's acting coordinator of instructional technology.

He acknowledges that the district has invested little in technology training for teachers or in people to provide more technical support. Consequently, Ponas says, the schools are playing a game of catch-up. "Without focusing on human beings, we've lost some ground," he says.

Ponas points out that the wages the district offers technical-support employees are far behind the going rate in nearby suburban districts and the private sector. As a result, 16 of 59 technical-support positions went unfilled for the better part of this school year.

At the school building level, the lack of technical support frustrates teachers, often discouraging them from using technology. "Sometimes, I feel inadequate because I can't answer everyone's problem," says Rich Marasti, who splits his time between teaching business classes and providing technical support at the Perry Traditional Academy, a 1,036-student city high school that district officials say is considerably ahead of Oliver in its use of technology.

And, unlike in some other urban districts such as Milwaukee, where a third of the schools have opened computer labs for extended hours after the school day ends, no far-reaching efforts have been made to provide such services in Pittsburgh. That leaves some of Pittsburgh's poorest children--who don't have home phones, let alone computers--grasping for access wherever they can find it.

With the city schools facing a $37 million budget deficit last year that forced the school board to raise taxes and approve shutting down 11 schools over the next two years, closing the digital divide is going to be a tricky task. But Superintendent John W. Thompson warns that the consequences of failing to confront the divide here "could be devastating to our community."

That is especially so for a school like Oliver High.

On the Precipice of the Divide

As snow flurries fall on a patented cold, gray Pittsburgh day, students in thick winter coats and knit hats climb the steps leading to the front entrance of Oliver High, a drab block of concrete built in 1925. They pass through metal detectors on their way into a hallway, and blue-uniformed school security officers sporting walkie-talkies sift through the handbags and book bags of students who set off the metal detectors.

During the day, teachers are instructed to lock their classrooms whenever they leave them. Faculty restrooms are locked, too. And the school conducts frequent hallway sweeps, in which the main office orders teachers to lock their doors once the bell has rung denoting the start of a new class. All latecomers--and there are usually many--are rounded up and taken to the cafeteria.

Consider this as well: For three years, the school has struggled to get its attendance rate slightly above 65 percent, according to Principal Joseph Kmetz, who laments, "Our biggest problem is getting the kids here."

What's more, Pittsburgh school officials report that 60 percent of the students who attend Oliver are living in poverty (close to the district average of 64 percent) and nearly 70 percent are minorities--almost all of them African-American. Beyond that, roughly half of last year's 11th graders who took state exams in reading and math scored in the bottom quartile in both subjects, according to the Pennsylvania education department.

The Pittsburgh school system has largely ignored the human factors necessary to close the digital divide.

Somehow, then, it's not surprising that fewer than a third of the graduates of the class of 2000 went to four-year colleges. That statistic alone is a troubling reminder of the odds that many of the young people at Oliver High will end up on the wrong side of the digital divide.

A person with a college education is roughly 2Ω times more likely to use the Internet than a person with only a high school education is, according to "Falling Through the Net: Toward Digital Inclusion," a report released last fall by the U.S. Department of Commerce. And a college graduate is almost six times more likely to use the Internet than a high school dropout.

Those realities set Oliver--and other schools like it in Pittsburgh, as well as around the country--on the precipice of the digital divide. If technology offers better ways to learn, these are the students who need that boost the most.

High-Tech Hopes and Classroom Realities

The reality, of course, is that some of these students will benefit from having teachers who know how to harness the powers of technology, but others will not.

One Oliver teacher who is infusing technology into lessons in a myriad of ways is social studies teacher Adjua Adama, a 26-year-old with a closely shaven head, a mustache, and a tuft of a beard.

On this day, Adama is wearing a white and maroon dashiki as he shows a visitor how he has transformed his classroom into an island of high technology. In the middle of his class, he has a laptop and a digital video disk, or DVD, player (which he purchased himself for use at home and school) and a school projector and VCR. "I find films that ... depict what I'm trying to convey. The DVD allows me to bookmark parts of the film and easily jump back and forth," he says.

If technology offers better ways to learn, these are the students who need that boost the most.

Adama turns his attention to geography. "I have the entire Encarta series right here," he says, referring to encyclopedia software created by Microsoft. To showcase how he uses it to teach sophisticated geography skills--such as creating population and climate-zone maps--Adama clicks on a virtual map of the United States. On a large screen behind him, a map image appears, showing red dots concentrated around highly populated areas. The program zeros in on specific states and regions. It shows what a land mass looks like from satellite images taken during the day or night, and it closely outlines topography such as deserts and mountains.

He clicks again to show an image blanketed with red dots. He has landed on China, the most populous country in the world. "You should have heard the students when they saw that--it really conveys the aspect that they've got a lot of people over there," Adama says.

Showing his students the world would be nearly impossible using paper maps alone, he says, but technology puts thousands of maps at his fingertips.

Last year, Adama required his regular classes as well as his honors ones to do social studies projects using technology tools such as the Internet, Encarta, Microsoft Word, and Publisher. They created newsletters--based on academic research evaluated by Adama--about different countries.

This year, Adama plans to give a similar assignment to his honors classes, but he doesn't think he'll use as much technology with the regular classes. "It's motivation," he frets. "The mainstream classes I have this year are just not as motivated. It's a shame.

"You spend a lot of time going over basic technology stuff with the mainstream kids," he says, pointing out that teaching those remedial technology skills steals time away from covering the academic content he wants to complete. "I didn't have to worry about going over the basic technology stuff with honors kids--they already knew how to do it."

Adama is not the only teacher who has experienced that reality and adjusted his technology expectations accordingly.

Rose Haverlack, an English teacher at Perry academy, says "it's easier to use technology with the more motivated kids."

"They will try things on their own; ... they're interested in producing something. The average kids just want to be entertained. In order to get them to the lab and explain things to them," she says, "you wouldn't get anything done. They end up focusing on the technology instead of the content."

By forgoing the use of technology or using less with underachievers, teachers could be unknowingly contributing to a widening of the digital divide.

Still, some educational technology researchers are cautioning that by forgoing the use of technology or using less with underachievers, teachers could be unknowingly contributing to a widening of the digital divide between high achievers and low achievers.

Henry J. Becker, a professor of education at the University of California, Irvine, points that out in "Who's Wired and Who's Not: Children's Access to and Use of Computer Technology," which was published this winter in *The Future of Children* .

Analyzing data from thousands of students and teachers and hundreds of schools, Becker concluded that "among teachers of the same subject, English teachers used word processing software much more often with high-achieving classes; computer and social studies teachers used presentation software more frequently with high-achieving classes; and social studies teachers used Web browsers more with high-achieving classes."

Others have found similar results.

Janet Ward Schofield, a professor of psychology at the Learning Research and Development Center at the University of Pittsburgh, conducted a study in the late 1990s on how Pittsburgh public school teachers were using technology in their classrooms. "Within schools, it was fairly common for kids in certain niches to have more access--those niches tended to be programs that served upper-level students," Schofield says of her research.

Even in mixed-ability classes with up to three computers in a room, Schofield found teachers made decisions that led to unequal access. For instance, some teachers gave access to the machines as a reward to students who were caught up on their work and behaving in class--in other words, usually academically stronger students.

And, she says some teachers also gave more computer access to students who were already skilled technology users. "Those kids," she recalls, "tended to be kids with home computers, from higher-income families, and higher-education homes."

Says Schofield: "In a sense, the technologically rich got richer."

A Different Take on Technology

Social studies teacher Tim Sullivan, who spent 26 years as a criminal-defense lawyer before returning to teaching about seven years ago, admits he's a latecomer to the digital revolution. A kindly, almost grandfatherly figure with a preference for casual clothes, he is affectionately called "Doc" by some students and teachers in honor of his law degree.

Sullivan, who was a teacher in his younger days before becoming a lawyer, says he chose to restart his teaching career at Oliver High over a wealthier, less troubled high school.

Although he is pondering ways he can infuse technology into future lessons, Sullivan has chosen not to use it regularly in his teaching so far.

That is due, in part, to limitations on access at school and a relative lack of time and good training available to teach him how to infuse technology into everyday learning. His classroom has only one computer--in Sullivan's tiny office, adjacent to the room. On that computer, he records grades and attendance and does other administrative tasks. But not much else--he can't use it for e-mail or Internet research because his classroom will not be wired until next year.

> Some evidence suggests that technology can actually become a crutch that places students who use it too much at an academic disadvantage.

Whatever the benefits e-mail or the Web might offer teachers, Sullivan is still not sold on the idea that technology is really the answer to bridging the achievement gap between poor students and their better-off peers. "You've got to get the basics down before you even think of infusing technology into learning," he says. "I'm just getting these kids now to the point where they'll sit and listen to me for 15 minutes ... and they no longer skim-read."

Other Pittsburgh teachers express even greater skepticism about the role technology should play in teaching. When asked whether she planned to infuse more technology into her instruction, Perry academy math teacher Jan Trafican, a 30-year veteran, answers pointedly: "Neveróabsolutely never. I'm a back-to-basics person."

Such skepticism is worth noting, because some evidence suggests that technology can actually become a crutch that places students who use it too much at an academic disadvantage--a sort of digital divide in reverse.

In a report released last September by the Brookings Institution, a Washington think tank, researchers found that 4th graders who reported using calculators every day in school had the lowest scores on a National Assessment of Educational Progress math test, compared with children who never used calculators or used them sparingly. Beyond that, the study found, black students were nearly twice as likely to use calculators every day as white students. Hispanic students were about 1 Ω times more likely than white students to use calculators every day.

The report concludes: "Providing access to new technologies, only to learn later that they hinder learning, does not advance the cause of educational equity."

Educational technology advocates counter that it's how the technology is used--not simply access to it--that makes all the difference.

Tamara Harris, a 17-year-old junior at Oliver, is sitting in a chair in Sullivan's office tapping her feet nervously, talking about how she rarely uses computers for academic classes. Rather, she uses it mostly for business and career-related classes to learn how to enter data, format business letters, improve her typing speed, and hone other technical skills.

Occasionally, she might use Microsoft Word to type an English or social studies paper. And she used the Internet this year to do some cursory research for a short, one-page biography of a scientist for a science-timeline project. But that's it. "Oh no," Harris says, "we don't go to the computer lab for math--we learn from the book every day."

Her technology experiences are not unlike those of other students who attend poor urban and rural schools, says Mark Warschauer, an assistant professor of education at UC, Irvine.

A few years ago, when Warschauer was a professor at the University of Hawaii, he conducted a study of two high schools in the stateóone a public school in an impoverished community in the state where the per capita income was less than $10,000; the other, an elite private school in Hawaii. His study, "Technology and School Reform: A View From Both Sides of the Tracks," sheds some light on how the digital divide manifests itself even when schools have relatively good access to multimedia computers and telecommunications.

Educational technology advocates say that it's how the technology is used--not simply access to it--that makes all the difference.

Warschauer recalls that both schools were heavily integrating computers and the Internet into classrooms, but those machines were serving "very different functions."

At the private school, he says, teachers were using technology for mostly scholarly purposes. For example, students in physics classes analyzed computer-based simulations of motion experiments and followed that by conducting real experiments in laboratories using frictionless air tubes. In biology classes, students used palm-sized computing devices to gauge the temperature and acidity of plants around nearby ponds and downloaded that data to classroom computers to graph their findings.

At the public school in the poor community, meanwhile, technology was used largely to teach students narrow technical skills--such as Web-page design--or to produce other projects that required little, if any, academic rigor. For example, a newsletter the students produced using state-of-the-art publishing software for a marine-science project was generally devoid of "hard scientific information," Warschauer found. Instead, it focused more on the students' personal experiences learning about marine science.

"So much of digital-divide talk is focused on how many computers a school has and how many have Internet access," Warschauer says. "But it takes much more than putting in machines."

'Where We Fall Behind'

If there is such a thing as a technology evangelist, Glenn Ponas fits the profile. The former math teacher--who is as comfortable flinging around techie terms like "gigabytes" and "bandwidth" as he is chatting about quadratic equations and derivatives--talks with the speed and purpose of someone who is obsessed with catching up.

These days, in his role coordinating instructional technology, his primary obsession is creating a technology plan to bring Pittsburgh up to speed with other districts. To see how well the city's schools stacked up against other urban districts, Ponas visited the Austin and Houston school districts in Texas because they had taken aggressive steps to close the digital divide.

His conclusion: "We stack up very well as far as the stuff we have. ... [But] they're ahead of us in technical support, policy articulation, and staff development. That's where we fall behind. And compared to Houston, we are very far behind."

For example, in Pittsburgh, the instructional-technology staff is responsible for evaluating technology bids, and buying hardware and software and installing it--all duties tacked on to the technology employees' primary roles as teacher trainers, curriculum specialists, and technical troubleshooters. In Houston, Ponas found, the instructional-technology staff is responsible for none of those additional duties; its focus is primarily on instructional technology and training teachers.

Digital-learning advocates say the phrase 'digital divide' is so overused it has almost become a clichÈ, blurring the underlying threat of what it really means.

What's more, every school in Houston has an educational technologist, a person with an education and technology background responsible for training teachers and fixing technical problems. Some schools in Pittsburgh have people filling similar roles comfortably; others don't, Ponas says.

In addition, he says, Pittsburgh's residency requirement--which means that school employees have to live in the city--makes it next to impossible to attract tech-savvy educators and other technology professionals who live in the suburbs. No such residency requirement exists in Austin or Houston.

Looking ahead to how the district might end its digital divide, Ponas proclaims: "The people are the common denominator."

Recently, Ponas says, much of the talk about the digital divide in Pittsburgh and elsewhere has turned to what students, parents, and teachers are doing with technology after school hours. Who has access to computers at home? Of those who do, is it regular, high-quality access? Or are there barriers that prevent them from using technology?

Jeston Robinson, 17, an Oliver High senior wearing a white T-shirt and a gold chain dangling around his neck, is hunched over a computer keyboard in one of Oliver's technology labs, working on an essay about the African-American writer Richard Wright for an advanced English class.

Robinson says he has a computer at home, but it's been broken for about two years. "I never bothered to get it fixed," he says, shrugging. "Now, it won't even boot up."

Did he call a computer help desk for assistance? Robinson shakes his head.

Could anyone else in his family fix it? He shakes his head again.

"If I need a computer to do my homework," he says, "I go to [a friend's house] or the library. If I can't get to his house or the library, I just don't do the assignment."

Robinson's experience with his home computer highlights a quirky wrinkle of the digital divide--one that researchers at Pittsburgh's Carnegie Mellon University outlined in a 1999 study, "Troubles With the Internet: The Dynamics of Help at Home."

The researchers analyzed 93 Pittsburgh families and 237 family members who were recruited from public schools in the city and given computers and Internet access. Among other findings, the researchers discovered that the people who called a computer help desk the most were not those in greatest need of help. Rather, those who sought help most tended to be the most skilled computer users. Many of the people who had the least knowledge simply gave up and chose not to seek assistance from the help desk.

In one interview, a girl told the researchers: "Yeah, it would get me to the point where I would just [say], 'Forget it.'"

Still Struggling for Access

The digital divide can also be seen through the hopeful eyes of Mionna Green, 10, a slight girl with a ponytail tied up in a baby- blue ribbon. She lives in one of the city's poorest areas and serves as an important reminder that, for many children, simply having access to computers remains a serious problem.

On a cold evening, she is sitting in an empty classroom inside the warm confines of Hill House Association, a community center decorated with pictures of the Rev. Martin Luther King Jr., Malcolm X, and other African-American legends. Among a host of other services, the center offers Internet access to young and old alike.

And that's one of the things Mionna likes so much about going there after school. She says "it's hard" not to have a computer at home. "I have things to do for school," she says. "So usually I do them over here."

Her mother, Linda Green, arrives later to pick her up. Draped in a thick black winter coat, Green, a 46-year-old single mother raising four children, sits at a round table near the community center's entrance.

She is working full time and attending school part time to become a nurse. Before going back to school, she had no experience using computers. Now, she says, "I need to use it more and more."

And that has made her believe her children need more access to it, too.

Her voice perks up when she talks about how much it would help her, and her children, if she had a home computer. And she smiles at the thought.

But Green is tired at the end of a long day, rings have formed under her eyes, and she hunches forward. Mionna dons a winter jacket, rests her elbows on the table and her chin in her palms. It is growing dark outside, and she is ready to go home.

Green is asked when she thinks she'll have a home computer. She eyes her daughter, then stares ahead, expressionless, and repeats softly, "at some point ... at some point."

On The Web

Agenda for Action, introduced by the superintendent of Pittsburgh Public Schools, June 13, 2000, outlines an improvement plan for the district, including technology integration and professional development.

Pittsburgh's school district gives some answers to FAQ's concerning the district's technology plan.

"Falling Through the Net: Toward Digital Inclusion," October 2000, from the U.S. Commerce Department, finds that "a digital divide remains or has expanded slightly in some cases, even while Internet access and computer ownership are rising rapidly for almost all groups."

PHOTOS: The computers in teacher Bob Vukela's classroom at Oliver High School in Pittsburgh are older than many of his students. In fact, they're so old that replacement parts for the machines are no longer manufactured. Here, Vukela helps student Mark Abbott. John HellerSocial studies teacher Adjua Adama is one of the most technologically adept teachers at his Pittsburgh high school. Still, he frets that it's difficult to infuse technology into classes with unmotivated students.
--John Heller

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THE ISSUES

May 10, 2001

Closing the Digital Divide

By Andrew Trotter

It is a heady feeling to be involved in a political or social cause at the moment it sweeps the nation. And Mark Diaz knows the feeling. Diaz is one of the directors of Street-Level Youth Media, which gives Chicago teenagers opportunities to use video and Internet technology to create art projects after school. The 5-year-old project gained the national spotlight last spring, when President Clinton visited it on his New Markets Tour. "As soon as [the visit] hit the news, we got phone calls coming in and congratulating us," Diaz says.

Other projects that give access to information technology to people who can't afford it, or technology skills to those who lack them, have gleamed in the media spotlight over the past 18 months, as the movement to bridge America's "digital divide" climbed to the top of the public agenda. Youth workers and technology advocates who spent the past half-decade running storefront computer centers, installing computers at libraries, and opening up school computer labs early and keeping them open late have been gratified at the attention, which they say is overdue.

"It put us in the place we should be," declares Diaz.

The Clinton administration deserves credit for putting the digital divide in the spotlight, says Andy Carvin, the digital-divide guru of the Benton Foundation, a Washington-based nonprofit organization that has served as a clearinghouse on digital-divide issues. Clinton's

The Issues

- Dividing Lines
- Introduction
- Money Matters
- Racial Disparities
- Not Enough Girls
- Academic Record
- Rural Connection
- Special-Needs Gaps
- Language Barriers

- Beyond Machines

- Closing the Digital Divide
- Tech Projects

- Student Survey
- About the Survey

Related *Education Week* stories:

"Federal Study Details Major Barrier to Internet Learning," Jan. 10, 2001.

"NetDay Switching Its Emphasis to Needs of Poorest Communities," April 26, 2000.

"College Board Sets Sights on Closing 'Digital Divide'," Feb. 2, 2000.

"Philanthropic Effort Aims to Help Close

'Digital Divide',"
Nov. 17, 1999.

tour during the last months of his presidency was important, he says, but so was the Digital Divide Summit held in Washington in December 1999 by then-U.S. Secretary of Commerce William M. Daley. It brought together influential corporations and foundations that had been working separately on the issue, Carvin says.

That coalescing of different groups arose just as the World Wide Web, e-mail, and online learning came of age. Together, such groups began to highlight the wide disparities in access to all those new technologies. And Clinton and Vice President Al Gore championed new federal efforts to address the problem, through grants and technical assistance for technology purchases; after-school programs and community technology centers; donations of used government computers; and the E-rate program, which offers discounts on telecommunications equipment and services to schools and libraries.

With 20,000 services scattered across the nation, technology advocates are seeing progress.

But now, many of these initiatives are up for review by the Bush administration, which has signaled that it may not make the digital divide as high a priority as the Clinton administration did. For example, the Bush administration's fiscal 2002 budget will reportedly seek to slash the federal Technology Opportunities Program grants, which support community technology partnerships, from the $42.5 million budgeted in 2001 to $15 million.

Others question how an intense focus on the digital divide might shortchange other priorities, especially ones that affect schools.

William L. Rukeyser, the executive director of the Woodland, Calif.-based group Learning in the Real World, says "one of the hazards of focusing on the digital divide is that it tends to overshadow other divides. In my experience, kids living in poverty tend to have less of everything that money can buy."

Some researchers, too, have voiced skepticism about the seriousness of the divide, suggesting the problem has been exaggerated and that it's unnecessary for the federal government to play such a prominent role in fixing it. "Clearly, the vibrant PC market is doing more than an adequate job of providing computing technologies to all Americans," wrote Adam D. Thierer, an economist at the Heritage Foundation, a Washington think tank, in a paper published in April 2000. "Free computers and inexpensive computing technologies are filling any digital divide that remains."

20,000 Services

As it is, more than 20,000 digital-divide-related services are listed in a new, online national directory offered by the Benton Foundation at www.digitaldividenetwork.org.

The sites, many of which offer free Internet access and information-technology training, include public libraries, community technology centers, "PowerUP" sites, the U.S. Department of Housing and Urban Development's "Neighborhood Network Sites," U.S. Department of Commerce "Technology Opportunities Program" grantees, and Urban League centers, according to the foundation. (The site offers an online search tool that will provide a map of centers nearest to any U.S. postal ZIP code.)

Among the groups on the list are some established youth-service organizations that have modified their missions to include the digital divide. The Boys & Girls Clubs of America, the Girl Scouts of America, and the National Urban League all have digital-divide projects, in partnership with other groups. Last December, for example, the Microsoft Corp. contributed $100 million to help put technology centers into every Boys & Girls Club in the United States.

The nation's best resources for spanning the digital divide, except for its public schools, are its public libraries. Ninety-five percent of the 16,090 public libraries and branches across the country now offer Internet access to the public, up from 76 percent in 1998, according to the American Library Association. Libraries have been able to do so because of the E-rate program and the more than $2 billion in equipment and software donated by the Bill and Melinda Gates Foundation, says the ALA's president, Nancy Kranich, who calls both sources instrumental in equipping libraries for the demands of the information age. Libraries are especially effective access points, she adds, because librarians can help users choose from "a vast sea of unwashed resources out there."

"Seventy percent of health information on the Net is erroneous or outdated," Kranich cautions, as one example of the need for careful use of the Internet's trove of facts and fallacies.

Almost half of public libraries are now providing technology training to the public in how to use a computer and to critique information, she says. Libraries have also invested in purchasing licenses for electronic materials, including costly information services such as Lexis/Nexis.

Reaching for Deeper Solutions

The nation's response to the digital divide--while impressively broad--has not reached deeply into the problem, says the Benton Foundation's Carvin. "There's been tremendous improvement over the past few years in digital-divide investments, but there's still a long way to go," he says.

Richard Cutler, a senior research associate at the Tomas Rivera Policy Institute, adds that it's a false impression that digital-divide programs have sprung up everywhere. The Claremont, Calif.-based institute, which specializes in studying Latino issues, has conducted a multiyear study of digital-divide projects that involved field visits and data analysis of 30 of the best ones. The findings of the Digital Steppingstones Project are scheduled to be released this spring. Cutler says that in many poor communities, access to technology is available to the public at one place—often the school or the public library—but that's it.

Each venue has its limitations, such as its hours of operation and availability of trained staff members. Some are for children only, while others are open to anyone. A local community technology center might emphasize a particular use or application of technology--the arts, for example--that some youngsters might simply not be interested in. "Out of 900 kids in a neighborhood, you get only 30 to 60 kids [participating]," Cutler says. "It's not something that sweeps the neighborhood."

Some educators question how an intense focus on the digital divide might shortchange other priorities, especially ones that affect schools.

By contrast, upscale communities have many layers of access, he points out, from schools to libraries to many other organizations with various styles, themes, and hours of operation--plus the ubiquitous home computer.

The problem of having limited layers of access is all the more acute because many of the organizations that provide access are small and somewhat fragile. "The problem areas are sustainability, scalability, and continuity in staffing," Carvin says.

Youth-service organizations often rely on part-time or volunteer staffs, and the salaries they pay are low--all of which means high staff turnover, especially as staff members pick up marketable technology skills they can use elsewhere.

Or they burn out: One free Internet service for low-income people in Charlotte, N.C., for example, folded after the charismatic community activist who had organized it became frustrated and left.

Beyond that, funding sources are often unstable. "The culture of many nonprofits of living from one grant to another makes life very, very difficult," Carvin says. "If you can't have guaranteed income coming in, you've got to spend a lot of time figuring out where the next grant check is coming from."

And having several small organizations means fragmentation of services, unless they are skilled at working together.

Indeed, working together is seen as the key, but cooperation doesn't come naturally. "There's not a lot of effort to look at how [different groups] can be brought together," says Terry Grunwald, a technology consultant in North Carolina who has helped community networks and technology centers.

School districts are in a good position to be catalysts, because they often have a comparatively easier time securing grants--federal money for after-school centers, for example. Unfortunately, school officials often don't think they can afford to share. "There's just such a lack of resources that they don't think about moving beyond the institutional walls of schools to approaches that will increase the pie for everyone," Grunwald says.

And rarely is much funding available to promote cooperation.

Forming a broad "digital-opportunities coalition" in a single community is one effective approach, Grunwald suggests. She argues that such collaboration would be more common if more funders would require or encourage collaboration or local matching funds, as the federal Technology Opportunities Program does.

The Best Solutions

Researchers from the Tomás Rivera Institute found much that impressed them at the 30 digital-divide projects that they visited; 25 of those projects will be described as "exemplary" in a forthcoming report, which will also distill lessons for other projects.

Generally, the exemplary projects focus on providing supplementary computer access and tutoring for young people who are about to enter junior high school, says Cutler. He adds that those students "supposedly get access [to technology] at school, but in reality they don't get very much."

The 25 projects share three characteristics that make them effective and sustainable, Cutler says. First, they have found reliable funding, usually by having a mix of public and private money, and even generating revenue themselves. Some projects, for example, use desktop-publishing equipment to print brochures or decorate T-shirts, or use Web design tools to earn money building Web sites for public agencies.

Second, the successful projects provide adequate staff training--both for the staff members who work directly with students and those who manage the program and represent it to the public.

Finally, and perhaps most important, the projects have a unified vision shared by all the participating groups, and that vision is focused on children. "Where there is not a unity of vision, what happens is you have different people thinking they're working toward the mission, but they're working on different things," Cutler says.

Successful programs have reliable funding, provide adequate staff training, and have a unified vision.

Yet few partnerships are without tensions and conflicts, and community-service organizations and community advocates often view with healthy skepticism the arrival of corporations or national foundations with fat wallets and standardized plans. "Corporations are pursing the McDonaldization of community networking, but it makes it hard because they're promoting particular products," says Grunwald. Almost without exception, corporate efforts to bridge the digital divide involve moving products, even if for free. As some technology marketers admit, give-aways benefit the corporation by establishing brand names and technological preferences, preparing the ground for future sales.

For example, Sun Microsystems Inc., which has generously supported digital-divide programs such as the "NetDay" movement to wire schools, presents its so-called network computing as a digital-divide solution.

Just providing personal computers won't eliminate the digital divide, says Kim Jones, Sun's vice president for education markets, referring to the competing approach of running software over increasingly powerful desktop machines. "Those computers have to be replaced all the time," Jones argues, "and we can't really get enough computers for one go-round."

In Sun's solution, the latest software and a wealth of educational content are stored on centralized computers and distributed to users over a powerful network; users in schools, community centers, and homes can fully use those resources by using older, less powerful computers that are attached to the network.

Some of Sun's competitors, however, argue that people still need the reliability and power of personal computers.

Lifting People Up

National projects that are backed by corporations do recognize that alliances with local community organizations are essential, because those groups know how to "segment the stuff for a lot of [local] populations" and market it to them with the benefit of inside knowledge, says Grunwald.

But without some elements of a fast-food franchise, some experts say, good ideas will remain isolated success stories. "It's only through partnerships that 'scalable' success can happen," says Rae Grad, the chief executive officer of PowerUP, a nonprofit national network, based in Reston, Va., that distributes resources to selected local programs. PowerUP's three-stage formula for partnerships starts with large corporate partners, which provide the financial muscle. Local nonprofit partners are the second level, because they provide the adults who actually work with the children and other people who need access to technology. The third level is local, state, and federal government agencies that have the political clout to make things happen.

Looking ahead, Carvin says that the problem of the digital divide "may never be solved. At the point where you get low-cost Internet access, there's a new technology that comes along that recreates the divide, such as broadband or wireless technology."

"The challenge," he points out, "isn't to literally bridge the divide, but to ensure there are opportunities for people to lift themselves up."

On The Web

Chicago's Street Level Youth Media supplies a selection of Web-based projects that youths in the program have produced.

An overview of the federal Technology Opportunities Program, from the National Telecommunications and Information Administration, describes how the grants are administered and what they can be used for.

The Digital Steppinstones project, conducted by the Tomas Rivera Policy Institute, is looking at the success of 30 programs that are trying to close the digital divide.

The Benton Foundation's Digital Divide Network provides on its new digital divide database.

PHOTOS: Richard Cutler, a senior research associate at the Tomas Rivera Policy Institute in Claremont, Calif., conducted a study of digital-divide projects that involved field visits and data analysis of 30 of the best ones. One major problem, he found, was staff turnover. --Davis Barber

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May 10, 2001

Projects Offer Access, Training

By Andrew Trotter

In some of Chicago's toughest neighborhoods, professional artists are showing urban youngsters how to use technology to express themselves through video and Web art. In Massachusetts, a special digital-divide project is harnessing the powers of the World Wide Web to help teachers find lessons linked to state academic standards. Meanwhile, in Charlotte, N.C., community activists are providing public school students with special computer training after school.

There are more than 20,000 projects under way across the country aimed at bridging the digital divide, according to the Washington-based Benton Foundation, a nonprofit group working to close the digital divide. To be sure, it would be impossible to tell the stories of all of them. But, according to education technology experts, some projects stand out from the pack. Here is a small sampling—just six—that experts identified as being particularly effective.

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Powering Up Technology

In little more than a year, PowerUP—a national organization that offers computer access and training to youngsters in impoverished neighborhoods and schools—has expanded from four to 300 sites.

For more information

Read more about the PowerUP program.

It's not a demo, it's a rollout," says Rae K. Grad, the chief executive officer of the nonprofit organization, which was established by the family foundations of Steve Case, the founder of America Online Inc. and now Chairman of AOL/Time Warner, and Ted Waite, the chairman and CEO of Gateway Computer Inc., along with several other corporations and nonprofit groups.

PowerUP's concept is to create a package of technology equipment, infrastructure, and training that could be provided to local agencies that are experienced in serving poor communities.

In January, the national program, based in McLean, Va., launched its largest state-level partnership, with Florida. A Florida coalition, including the governor's office, will set up 24 PowerUP sites this year with computers, Internet access, trained adult mentors, and other program features for 6- to 18-year-olds in urban areas of the state.

Most PowerUP sites are at YMCAs, Boys & Girls Clubs, and centers run by the

National Urban League and similar groups. Some sites are in schools that provide after-school programs financed by grants under the 21st Century Community Learning Centers program of the U.S. Department of Education.

The PowerUP program gives local partners a standard set of resources: computers, staff training, access to a Web portal, and PowerBars snacks. Some call that arrangement the "McDonald's approach" to the digital divide.

But Grad says that label "overemphasizes the sameness and underemphasizes the community uniqueness" of the sites.

Massachusetts Movement

Effective small-scale programs are vital to delivering technology services to poor communities, but those efforts go further when a large-scale organizational structure gives them access to money, technology, political clout, and expertise. The Mass Networks Education Partnership has been a vital part in just such a structure in Massachusetts over the past five years. The nonprofit partnership, founded in 1996 as a NetDay project to mobilize volunteers to help wire Massachusetts schools-especially in low-income areas in Boston and the state's rural northwest-has evolved quickly.

For more information

Read more about Mass Networks Education Partnership, including its latest newsletter.

"I call [NetDay] half of a good idea," says Steven E. Miller, the partnership's executive director, referring to the volunteer efforts to wire schools to the Internet. The original "NetDays" had too little involvement by nontechnology companies, not enough input from educators, and little or no attention to professional development, he says.

On the other hand, Miller says the Massachusetts partnership, which includes education, business, government, and labor-union groups, has focused joint strategic planning on those deeper elements of promoting change.

"We look for good ideas and turn them into movements," Miller says, adding that working from both "the bottom up and the top down" is required.

The group campaigned for public support for giving teachers Internet access from their homes for just $25 a year for each teacher. So far, 27,000 of the state's 80,000 teachers have signed up.

The partnership has also helped develop the state's latest high-tech school resource: a free Virtual Education Space for public school teachers, students, and their parents.

VES, a Web service operated by a state-owned and -financed nonprofit corporation, provides templates to let teachers and schools create educational Web sites tailored to their specific needs. Eventually, students and their families will be able to create educational Web sites, too.

The partnership, in addition to promoting VES, helped create its core feature: a database tool to help teachers align their lesson plans to state standards.

The tool was the invention of a district curriculum expert, who found, at a partnership-hosted meeting, that educators around the state were hungry for such an aid. With help from the partnership, an upgraded, Web-ready version of the database tool will soon be available on the VES service, offered free to school districts throughout the state, Miller says.

A Community of Artists

At Chicago's Street-Level Youth Media centers, young people often use multimedia technologies to express the painful realities of urban life.

"They'll say one of their friends has been shot-they'll do a video project on that," says Mark Diaz, a sculptor and video artist who is one of the five co-directors of the organization, which runs three community centers in Chicago.

The centers, serving 8- to 22-year-olds, are in places where both art and technology are scarce, says Diaz.

One center is in the city's old armory building in the Park District; another is in a Hispanic community on the western edge of the city.

For more information

Visit Street-Level Youth Media, read more about it, and about its projects.

The third, a storefront center, is in a South Side, predominantly African-American neighborhood "where ...windows have plywood over them, and you have to walk quite a while to find a business that's open," says Norris Dickard, who during the Clinton administration was the U.S. Department of Education's in-house expert on community technology centers. Clinton visited the project last year.

But the center in that neighborhood shines as "one of the most successful of its kind," Dickard says.

Street-Level Youth Media's staff of 14 artists, many from the University of Chicago, serve as mentors to the children and adolescents who drop in to create individual or group projects using video cameras, software, and other tools. Some staff members conduct 10- or 15-week video-training programs in local schools.

The organization was formed in 1995 out of a merger between a community media lab and a center that was established as neutral ground for rival youth gangs. About 1,500 young people are being served by the centers this year.

Diaz says the organization thrives by having its leadership divided among five directors. "We have more of a net to spread out," he explains. "We don't believe one person can absolutely weave everything together."

Another strength is the group's broad base of financial support: Forty percent of its $1 million budget for 2001 is from a half-dozen foundations, and 60 percent from a mix of government agencies, including the Chicago mayor's office.

Loans for Home Computers

A lively debate among digital-learning advocates concerns whether it's best to focus on deploying computers and Internet access in the homes of poor families or in community centers.

"If you had to go to the library and read a book, and you left the book at the library, how much can you really learn?" says Steve D. Berry, the director of Riverside Community Online in Riverside, Calif.

For more information

Read the Riverside Computer Investment Program's executive summary; read its detailed report; and read its May 2001 survey results.

His group differs from organizations that provide donated older computers. The Riverside Computer Investment Program provides subsidized loans so families can buy computers that are new and powerful.

"People feel better about themselves when they're actually paying a part of it," Berry says.

A family pays $684 for its computer-which includes all fees, interest, taxes, and a one-year warranty-financed with a loan payable in 36 monthly payments of $19. The loans, extended without a credit check by a local credit union, are arranged over the phone and require no down payment.

The computers are multimedia PCs with speedy Intel processors, memory, data storage, modem, and color jet printer that are up to today's standard for home or small-business use. The families also receive software that includes Microsoft Works and Word and free dial-up Internet access and bilingual phone support.

Technicians from Riverside Online go to recipients' homes to hook up everything and will make repeat visits if necessary.

For less money-$10 monthly for 24 months-a family can choose to buy a used, reconditioned computer, with most of the same features.

The program is limited to families that have children in the Riverside schools who qualify for federal free or reduced-priced school lunches. The students must have passing grades and must have completed a basic computer course at one of four community centers before their families are eligible for the program.

After enrolling 30 families last September, the program has grown to 169 families. Forty more families are on the waiting list, as the group tries to sign up an additional credit union.

Charlotte's After-School Access

Their families might not be able to afford computers and Internet access, but some poor teenagers in Charlotte, N.C., are acquiring the same skills as many of their more affluent peers by getting time and personal technology coaching after school.

The Charlotte-Mecklenburg Urban League operates two computer labs downtown that provide the venue for eight-week training courses in a program that was launched in 1997.

"We're on the cutting edge of the digital divide; we're several years ahead of other agencies," boasts Sharon Jackson, the manager of the group's Linking Youth to Technology Through Education project.

For more information

More about the Linking Youth to Technology Through Education project.

Classes number up to 20 students, usually high school seniors who have been referred by teachers and counselors. School vans deliver students to the center twice a week for the one-hour after-school sessions. Teachers certified in technology train adult volunteers, who then show students how to boot up the computers, manipulate Windows software, manage electronic files, and operate word processing and presentation software.

The center also provides courses for parents and opportunities for all students to use the equipment outside of class.

Students don't need to be prodded to give up part of their afternoons because North Carolina now requires 12th graders to pass a computer-competency test as a graduation requirement-a chief focus of the course.

"It is a high-tech hurdle, so to speak-you must pass computer-skills tests," Jackson says. The long-range benefit will be to prepare the students for the modern workplace, she adds.

The project, technology experts say, is just one of a gaggle of efforts in Charlotte to make new technologies accessible to all in the city, where business leaders, educators, and social activists were quicker to grasp the importance of the Internet than their counterparts in many other small or midsize cities.

Beyond Isolation

The *colonias* , or informal settlements, scattered around the city of Mercedes, in Texas' Rio Grande Valley, are among the places least-connected to the rest of the nation, with spotty telephone and electrical services, few stores, no public transportation-and a psychology of isolation.

For more information

NetDay's mission, latest news, and digital divide program.

"It's real easy to fall into victimization mode. We're such a depressed area, and you've got to get out of here," says Lucilla Lagace, who grew up in the community composed mostly of Mexican immigrants.

After leaving for a time, she is back, building connections between students and community members and the outside world, through a partnership between NetDay-a nonprofit group working to close the digital divide-and the Mercedes Independent School District.

The project has brought in many other groups-including the city of Mercedes, the regional educational services agency, the regional federal empowerment-zone agency, the nonprofit social services group Communities in Schools, and several corporations-and drawn on federal and state grants and federal E-rate discounts for telecommunications.

The Michael and Susan Dell Foundation donated 300 computers to the 5,000-student district's seven schools, allowing older machines to be networked in computer labs in every school.

That infusion of new technology, along with teacher training provided by program partners, has enabled each child at Kennedy Elementary School to have time to work with computers daily, says Barbara Hinojosa, the principal of the school, which enrolls 520 students in grades 1-4. In February, her school held a festive, daylong session featuring computer activities and games focused on preparing students for state standardized tests.

The most ambitious phase will be finished soon: The district is building a Tech Dome facility, a center to use for training staff in the use of technology and giving students and their families access to computers after school hours.

PHOTOS: Dorry Lewis, a volunteer at a PowerUP site in the nation's capital, helps Johnathan Grady, 12. In little more than a year, the number of PowerUP sites nationwide has increased from four to 300.
-Allison Shelley
High school sophomore Gbassay I. Juana records graffiti art in his Chicago neighborhood using a digital video camera.
—John Zich

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May 10, 2001

Student Survey Says:

By Kathryn M. Doherty & Greg Orlofsky

It seems educators may be making more progress in providing access to technology than in figuring out how to use it as a learning tool. At least that's what middle and high school students are saying, according to a new *Education Week* /Market Data Retrieval/Harris Interactive poll.

Recent data from Market Data Retrieval show very high rates of technology penetration into the nation's schools. School spending on technology reached almost $5.7 billion in 2000, and the student-to- computer ratio in U.S. schools is now under 5-to-1. But are computers being used to help youngsters learn?

For this year's *Technology Counts* report, *Education Week* , in collaboration with Harris Interactive and Market Data Retrieval, conducted a poll of 500 students in grades 7-12 attending schools that participated in MDR's 2000 national survey of school technology.

Survey responses and school data were linked to examine students' opinions in the context of whether they attended schools categorized by MDR as high- or low- tech. The findings suggest that all of the nation's schools—whether rich or poor in technological resources—need to focus more attention on how to use their existing technology effectively in the classroom.

For instance, the survey found that 92 percent of students said having good computer skills improves the quality of people's lives "a great deal" or "somewhat," but only 40 percent said that knowing about computers is "extremely" or "very" important to how well they do in school.

Christy Judd, a 10th grader from Iverness, Fla., who responded to the survey, said in a follow-up interview that the tasks teachers ask students to do on computers aren't that important and often don't focus on what students are doing in class. Computers are simply used to cover "the basics," she says. "They don't really help us learn."

The survey results, based on the opinions of students, most of whom have access to computers at school and home, also reveal that most of what students say they've learned about computers has occurred at home rather than at school. While that's not necessarily a surprising finding, it's one that raises

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Related *Education Week* stories:

"Federal Study Details Major Barrier to Internet Learning," Jan. 10, 2001.

"Administrators Say Technology Calls for Range of Skills," Nov. 29, 2000.

"Study Finds Disparity in Internet Use," May 24, 2000.

"Laptops for All Doesn't Mean They're Always Used," June 7, 2000.

Teachers' Use of Computers for Learning

Grading Teachers

Fair Access to Computers

Digital Learning at Home

concerns about whether students are using computers to learn or mostly just to send e-mail to friends, play computer games, or scan the Web for entertaining material.

What's more, although educational technology researchers say computers are best placed in classrooms—rather than in special technology labs or libraries—the classroom is where students are least likely to report computer use, according to the survey.

Beyond that, the survey found, it seems that computers are not often used as tools to help students better understand sophisticated concepts or visualize something in a new or different way.

Some teachers, for example, may use 3-D graphics to help students visualize molecular structures or computer simulations to help them understand the physics of motion. Based on the perceptions of students in the survey, however, such teaching tactics appear relatively uncommon.

These findings wouldn't come as a surprise to Larry Cuban, author of the forthcoming book, *Oversold and Underused: Reforming Schools Through Technology 1980-2000.* He argues that the use of computers for academic learning occupies less than 10 percent of teachers' instructional time. And he suggests that only about 5 percent of teachers use computers imaginatively in their classrooms on a regular basis.

When it comes to providing students with access to technology, students in this survey gave their schools relatively good grades. Forty-four percent of the students gave their schools a grade of A for how available computers are in school, and 39 percent awarded B's.

Overall, 94 percent of students reported that "all" or "most" of their school computers were in good working order, and 90 percent of the respondents reported that it is "always" or "usually" easy to find an available computer.

But while access to technology in schools has improved for American students overall, some experts have expressed concern that schools are giving high-achieving students more access to computers than other students.

Generally, though, students in the survey didn't perceive favoritism or bias in who gets to use computers in their schools—87 percent said all students in their schools get equal chances to use computers. Only 12 percent of students felt as if certain groups or types of students—based on characteristics such as race, age, or ability—have more access.

However, 35 percent of students with access to computers in school said that teachers "often" or "sometimes" let students use computers as a reward for good behavior in class.

It seems educators may be making more progress in providing access to technology than in figuring out how to use it as a learning tool.

The survey also explored the issue of access to school computers after school hours. National data from MDR show that 93 percent of schools make computer equipment available to students outside normal school hours. However, the *Education Week* survey found that 69 percent of students said their schools allow them to use computers after school.

Only 4 percent of students said their schools would let students borrow computers to take home to do schoolwork.

Teacher Technology Use

Beyond access to computers is a more significant question for educators: How are computers used to support learning?

Norris Dickard, a senior associate with the Benton Foundation, a Washington-based organization working to bridge the so-called digital divide, explains: "We have blasted ahead in computer penetration in the last few years. The real challenge now that we've focused on infrastructure is using that infrastructure to maximize impact."

Data from MDR's *Technology in Education* report for 2000 suggest that technology use in the classroom is on the rise. Virtually all schools now report that they have at least some computers in classrooms—98 percent in 2000, compared with 73 percent in 1998. Roughly half of school computers, 52 percent, are found in classrooms. And, according to MDR, in three-quarters of the nation's schools, a majority of teachers are using computers for planning or teaching.

Yet the *Education Week* /MDR/Harris Interactive poll results suggest that schools have much work to do to maximize the impact of technology.

Generally, the survey found, students believe technology is important for learning and their future success in the working world. For example, 66 percent of students said computers help them learn, and 88 percent believe they are "extremely" or "very" important for career success.

Generally, the survey found, students believe technology is important for learning and their future success in the working world.

Students also tend to give their teachers relatively good grades on how they infuse technology into teaching. For instance, 20 percent of the students surveyed gave their teachers a grade of A, and 45 percent a B, when evaluating how well their teachers use technology to help students learn. Twenty- four percent gave their teachers a C; 10 percent handed out D's and F's.

But when students' experiences were probed a little deeper, some of the survey findings show there could be some problems that need to be ironed out in how schools are using computers.

For example, students reported that most of their school computer use occurs in technology labs and libraries, not classrooms. Thirty-nine percent of students reported that most of their computer use takes place in computer labs, and 35 percent said they most often use them in libraries, while only 24 percent reported they most often use school computers in the classroom. Many technology experts argue that classroom use is important because it allows students to use computers more regularly and seamlessly—rather than just for typically short, disjointed experiences in computer labs.

What's more, based on the survey findings, it appears that computer use in academic classes varies across subject areas. Sixty-one percent of students with access to computers at school reported using computers in English classes, 55 percent in social studies, and about 50 percent for science. But only 26 percent of students said they use computers in math classes.

According to the survey, 86 percent of students said their teachers have demonstrated how to use computers to write papers; 71 percent said their teachers have showed them how to use an Internet search engine. But much smaller percentages reported that teachers used computers to develop innovative approaches to help them learn. About half of the students surveyed reported that a teacher had used a computer to help them better visualize a concept. And only 29 percent of students reported that when they have trouble understanding something in school, their teachers use computers in ways that help them look at a problem in a different way.

Evan White, an 11th grader from Watertown, N.Y., who responded to the survey, said in a later interview that he has had only one class in high school in which a teacher used a computer to show how to solve a problem. When asked how teachers might better use computers to help him learn, White said he wouldn't know: "I never actually experienced teachers teaching hands-on with computers, so I'm not sure how it could help me learn."

His experiences and those of others who responded to the survey might explain, in part, why 34 percent of students reported that computers either make no difference to how much they learn in school, or actually distract them from learning.

Home and School

Students have better access than ever before to computers at school, but most of the students in the survey said most of their computer use occurs at home.

On average, the survey found, students spend a little under three hours a week on computers at school. And roughly 50 percent of students with access to computers in school reported spending one hour or less per week on school computers.

In contrast, students reported logging about seven hours a week on home computers.

Even among students attending "high-tech" schools that have more sophisticated computers than schools in general, 43 percent of students spend either no time or an hour or less using school computers each week.

> The survey reveals that schools may not be taking the lead in making sure that students have the technological skills and abilities they need for the future.

As a result, it is not surprising that students say they've learned most of what they know about technology at home. More than half the students surveyed (56 percent) said they have learned most of what they know about computers at home, while 39 percent said most of what they have learned occurred at school.

Such findings may be partly affected by differences in the quality of computers available at home and school. When asked to rate the quality of their school computers against those of their home computers, 61 percent of students with access in both places said their computers at home were better. Only 36 percent said their school computers were better than their home computers. Two percent reported no difference in quality.

Are Schools Doing Enough?

Overall, students who participated in the survey feel pretty confident about their computer abilities. Sixty-five percent of middle and high school students believe they know as much about computers as other youngsters their age, and 30 percent think they know even more than their peers.

Even so, the survey reveals that schools may not be taking the lead in making sure that students have the technological skills and abilities they need for the future. For instance, as already noted, 88 percent of students consider knowledge about computers to be "extremely" or "very" important for career success. But only 40 percent believe that knowing about computers is "extremely" or "very" important to how well they perform in school.

Because nearly all the students in this survey had access to computers, what they said about computer use might be a prelude of the challenges ahead for schools. More than anything, the survey results showed a wide gulf between technology's promise and the reality of how it is used in schools.

ON THE WEB »

Read "An Educator's Guide to Evaluating the Use of Technology in Schools and Classrooms," December 1998, from the U.S. Department of Education.

"The Power of the Internet for Learning: Moving from Promise to Practice," a report from the congressionally established Web-based Education Commission, addresses "key barriers that are preventing the Internet from realizing its full potential for enhancing learning."

Larry Cuban, author of *Oversold and Underused: Reforming Schools Through Technology 1980-2000* , discussed the impact of technology in a June 2000 interview posted by techLEARNING.com

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About the Survey

The *Education Week* /Market Data Retrieval/Harris Interactive Poll of Students and Technology was conducted by Harris Interactive. More information about Harris Interactive can be found at www.harrisinteractive.com.

A sample of students in grades 7-12 was drawn from a cluster sample of schools classified by the amount and type of technology available in the schools, according to MDR. MDR rates schools as high- or low-tech based on their number of instructional, multimedia, and 486 or higher-powered computers, speed of Internet access, and number of CD-ROM drives.

The survey included 500 telephone interviews of public secondary school students throughout the continental United States. All interviewing was conducted between Jan. 15 and Jan. 28 of this year. The interviews averaged 16 minutes a call, and were conducted by Harris' telephone-research centers in Youngstown, Ohio, and Rochester, N.Y.

Data were weighted to reflect the national population of public school students in grades 7-12 for key demographic variables. The margin of sampling error was plus or minus 4.5 percentage points. The sampling error is larger for the subgroups in the survey. The survey results can be viewed online at www.edweek.org/sreports/tc01/35survey.pdf. (Requires Adobe's Acrobat Reader.)

Students participating in the survey reported having a high level of access to technology. Ninety-four percent of the students said they use a computer at school. The same percentage reported using a computer at home. Ninety- one percent of students reported that they have access to the Internet at school; 88 percent reported having access to the Internet at home.

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Beyond that, the survey found:

- Though most students consider knowledge about computers to be "extremely" important (48 percent) or "very" important (40 percent) for career success, far fewer see such knowledge as important for success in school. Only 7 percent said computer knowledge was "extremely" important to how well they do in school; 33 percent said it was "very" important.
- 50 percent of students with computer access at school said they use school computers one hour or less a week.
- 43 percent of students in schools defined by MDR as high-tech said they use school computers an hour or less each week. Only 23 percent of students in high-tech schools reported using computers at least five hours a week in school.
- 57 percent of students with home computers said they use them at least five hours a week. Thirty-seven percent of students reported using home computers seven or more hours a week.
- 56 percent of students said they have learned most of what they know about computers at home.
- 61 percent of students with access to computers both at home and at school believe their home computers are of better quality.
- 90 percent of the students surveyed said it was "always" or "usually" easy to find an available computer at school.
- The vast majority of students who have access to computers at school give their schools an A (44 percent) or a B (39 percent) for how available computers are in their buildings.
- 45 percent said that "all" the computers in their schools were in good working order. Forty-nine percent said "most" computers were in good working order; only 6 percent said "few" were in good working order.
- 39 percent of students said they use school computers most often in computer labs, 35 percent said libraries or media centers, and 24 percent said classrooms.
- 87 percent of students surveyed believe that everyone in their school has equal access to computers.
- 35 percent of students said teachers use computer time as a reward for good behavior "often" or "sometimes."
- 20 percent of students awarded A's and 45 percent gave B's when grading how well their teachers use computers to help students learn.
- 68 percent of students said their teachers assign homework that requires the use of a computer. High school juniors and seniors were the most likely to get such homework assignments.
- Students reported that the three most popular activities they use school computers for are: "to do research for school assignments" (96 percent), "to write papers" (91 percent), and "to do homework" (62 percent).

- Most students surveyed said that computer skills improve the quality of people's lives "a great deal" (50 percent) or "somewhat" (42 percent). However, fewer than half (43 percent) said it would be difficult to live without computers.

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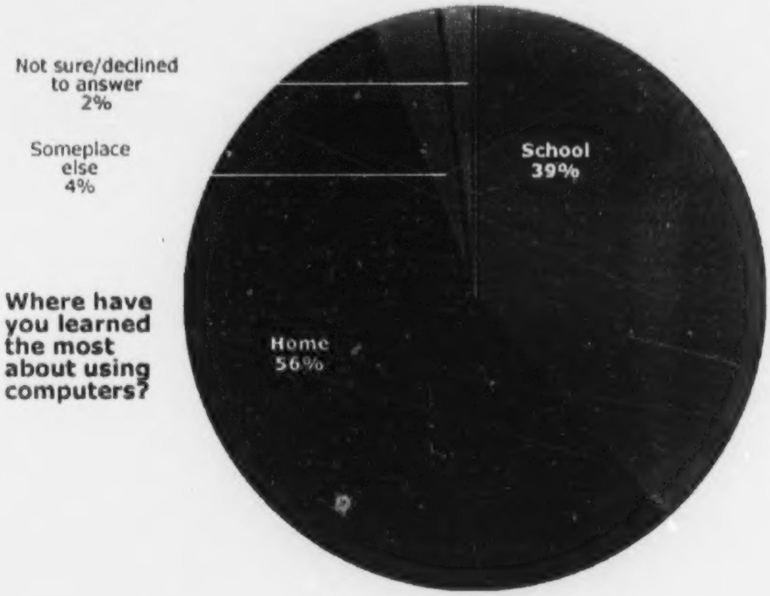
THE ISSUES

Learning About Technology

A majority of students surveyed said they learn more about computers at home than at school. Most students (61 percent) also said the computers they have at home are of better quality than computers at school.



NOTE: Percentages do not add up to 100 because of rounding.

SOURCE: *Education Week* /MDR/Harris Interactive Poll of Students and Technology, 2001

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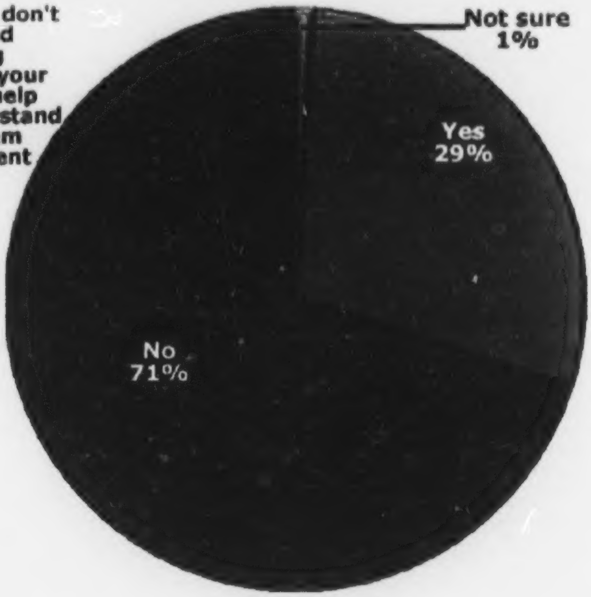
THE ISSUES

Technology as a Learning Tool

Although access to computers at school has grown considerably, teachers still may not be taking full advantage of the technology available to them. Only 29 percent of students reported that when they don't understand something in class, their teachers use a computer to help them understand the problem in a different way.

In class, when you don't understand something do any of your teachers help you understand the problem in a different way?



Note: Percentages do not add up to 100 because of rounding.

SOURCE: *Education Week* /MDR/Harris Interactive Poll of Students and Technology, 2001

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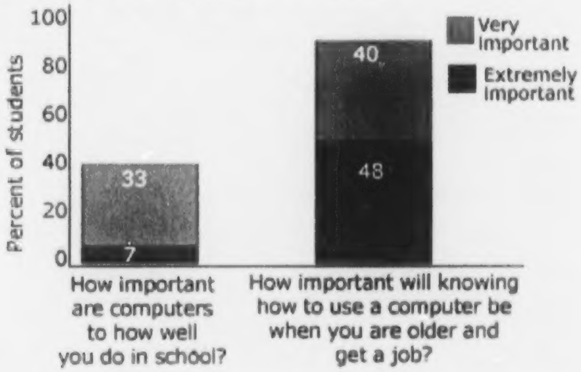
THE ISSUES

Importance of Computers For School and Work

Most students believe that computers are important to learning. But while nearly nine out of 10 consider knowledge about computers to be "extremely" or "very" important for career success, far fewer see computers as important for school.



SOURCE: *Education Week* /MDR/Harris Interactive Poll of Students and Technology, 2001

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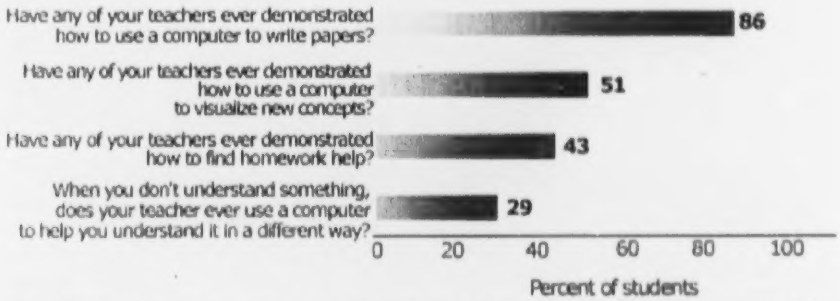
THE ISSUES

Teachers' Use of Computers for Learning

According to Market Data Retrieval, in three-quarters of schools a majority of teachers are using computers daily for planning and/or teaching. Still, the types of tasks most teachers use computers for are not very sophisticated. While 86 percent of students in the survey said their teachers demonstrate how to use computers to write papers, far fewer said their teachers are using computers to help them visualize new concepts.



SOURCE: *Education Week* /MDR/Harris Interactive Poll of Students and Technology, 2001

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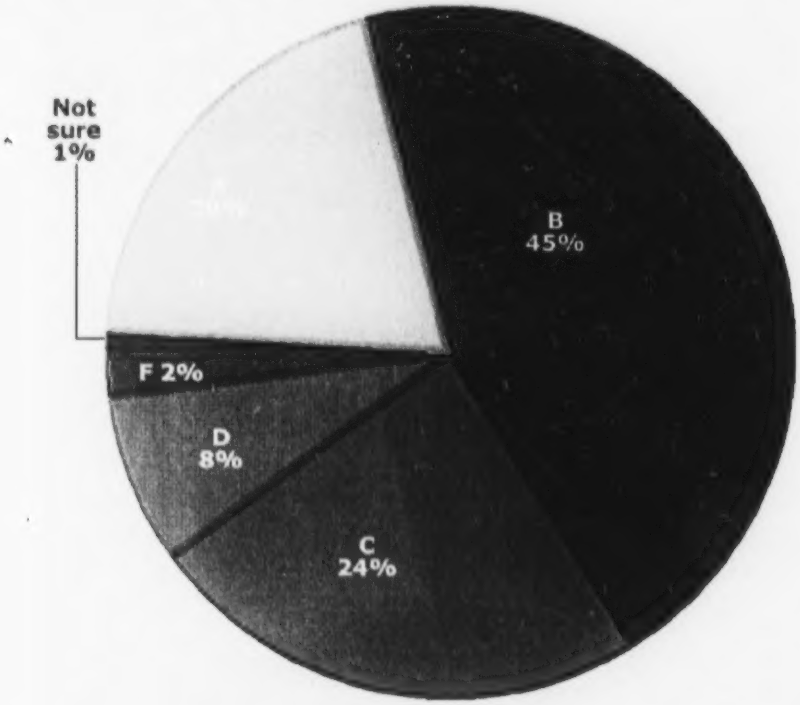
THE ISSUES

Grading Teachers

For the most part, students gave their teachers good grades when it comes to how well teachers use computers to help them learn. Sixty-five percent gave their teachers an A or a B for how well they use computers for learning.



SOURCE: *Education Week* /MDR/Harris Interactive Poll of Students and Technology, 2001

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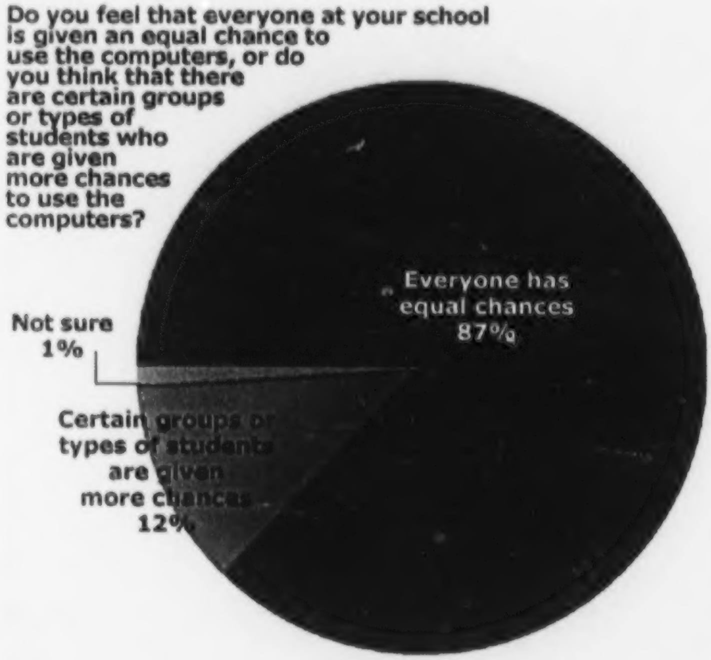
THE ISSUES

Fair Access to Computers

Eighty-seven percent of students believe that everyone in their school has equal access to computers.



Do you feel that everyone at your school is given an equal chance to use the computers, or do you think that there are certain groups or types of students who are given more chances to use the computers?

SOURCE: *Education Week* /MDR/Harris Interactive Poll of Students and Technology, 2001

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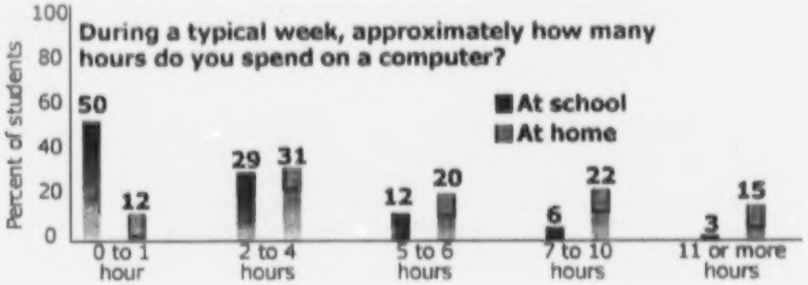
THE ISSUES

Digital Learning at Home

While access to computers at school and at home is fairly even, use at school and home is not. A full 50 percent of students said they use computers at school zero to one hour a week, while 57 percent said they use computers at home at least five hours a week.



SOURCE: *Education Week* /MDR/Harris Interactive Poll of Students and Technology, 2001

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STATE DATA TABLES

- Executive Summary
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May 10, 2001

New Challenges: Overview of State Data Tables

By Lori Meyer

With record gains being made in providing students with access to computers and the Internet, more schools are shifting their priorities toward other areas that have been simmering on the back burner—namely, figuring out how to integrate technology into the curriculum in meaningful ways.

But that's not the only challenge, according to a review by *Education Week* of data on technology access, capacity, and use in schools. To begin with, many schools are still using older, less sophisticated machines—a reality often masked by improving student-to-computer ratios. And, beyond that, access to first-rate technologies—such as Internet-connected and multimedia computers—is still greater in schools in wealthier communities and those with small percentages of minority children.

State Data Tables

○ OVERVIEW
○ Access to Technology
○ Capacity To Use Technology
○ Use of Technology

○ INDIVIDUAL STATE DATA

○ COMPARE STATES

View **all** the data for one state by going to our individual state data page.

Or, compare data among states.

Technology is also being more closely examined for its role in the movement for higher academic standards. Should states have educational technology standards for teachers and administrators as well as students? If they do, what should those standards measure?

Positive Trends

Public schools are leaping forward in their efforts to make computer technology more readily available to students. In 1997, the President's Committee of Advisers on Science and Technology declared four to five students for every school computer the magic ratio for effective use of technology for learning. At the time, the average student-to-computer ratio for the nation's schools was about 7-to-1, according to Market Data Retrieval, a Shelton, Conn., market research firm.

CHARTS

- Improving Picture
- A Classroom Divide
- More Sophisticated Hardware
- Closing the Gap
- Feeling Prepared
- Teacher Skill Level
- Barriers to Using Technology
- Teacher Technology Requirements?
- A Shift in Spending
- Students Report on Technology Use
- Digital Differences
- Rise in Use by Teachers
- Student Technology Standards?

In just three years, that ratio reached an all-time low of 4.9-to-1 last year, according to the most recent figures from MDR. Wyoming topped the list with three students for each computer, while California's ratio of 7.2 students per computer earned the state the worst ranking for the third consecutive year.

Moreover, MDR figures show high-poverty schools have an average of one computer for every 5.3 students—only slightly more than the average for low-poverty schools.

For schools enrolling high percentages of minority students, the ratio is 5.5 students for each computer, not much larger than the 4.6 average for low-minority schools.

Still, many questions linger. For instance, how sophisticated are the computers used in schools today?

According to the latest MDR figures, just over half of schools' inventories are 586-level machines, computers that use Pentium processors, or Power Macs—making them capable of running more sophisticated applications, larger amounts of data, and better computer graphics, all at faster speeds. They are also capable of running several applications simultaneously, something less powerful computers cannot do.

Between 1999 and 2000, the most notable change was the increasing deployment in schools of Pentium II-quality and even more sophisticated computers. The proportion of schools having at least one of those machines doubled from 11 percent to 22 percent over those two years. Still, about 28 percent of schools have some older 486-level machines or regular Macs, which are unable to perform as fast or handle as much data as the newer models; and roughly one-fifth of schools are using 286- or 386-level machines, or Apple IIs, which are among the oldest computers in schools today.

Even so, students now have greater access than ever before to multimedia and Internet-connected computers. The most dramatic improvement is the student-to-multimedia-computer ratio, which dropped from 21.2-to-1 to 7.9-to-1 over a three-year period. Multimedia computers, because they have sound and video features, allow students to use more advanced instructional software.

The number of students per Internet-connected computer also saw a big drop from 13.6 in 1999 to just fewer than eight last year.

Despite the progress, difficulties remain. Underneath the widely improving access figures are numbers showing that poor and minority children are still losing out compared to wealthier and white students. That is especially so when examining the use of more sophisticated technologies, such as Internet-connected computers. In high-minority schools, there is an average of one Internet-connected computer for every 10.5 students, while in low-minority schools, the average is 7.6, according to MDR.

And some states seem to be having more difficulty than others in providing equal access to all students. In New York, for example, students in high-poverty schools have one Internet-connected computer for roughly 15 students, but in low-poverty schools, the figure is just under nine students. New York shows similar differences between high-minority and low-minority schools.

> Public schools are leaping forward in their efforts to make computer technology more readily available to students.

According to MDR, there are, on average, 16.6 students per Internet-connected computer in schools with large minority populations, compared with 8.4 for those with small percentages of minority students.

Mississippi, in contrast to New York, has essentially the same ratio, 12.7 to each computer, compared to 12.4, respectively, in both high- and low-poverty schools. When it comes to Internet-connected computer ratios, high-minority schools are similarly equipped as low-minority schools in Mississippi, both having just under 13 students per computer.

The National Center for Education Statistics, which also tracks Internet access in the public schools, paints a picture of a divide in its most recent data collection from 1999. In schools where less than 11 percent of students are eligible for free or reduced-price lunches, 74 percent of instructional rooms have Internet access. In schools where 71 percent or more of students are eligible for free or reduced-price lunches, only 39 percent of instructional rooms have such access.

Technology experts tracking those trends see both bad and good news.

"We've definitely seen evidence that the digital divide exists, but trends that it is improving," says Kathleen Brantley, the director of product development at MDR.

Shifting Priorities

As access to computers has improved, a growing number of schools have begun to focus on other elements of incorporating technology into everyday learning. One of those areas is technology-related professional development for educators—something teachers say they desperately need.

"Across the board, the level of conversation around professional development is certainly more of a focus now than just talking about hardware and infrastructure," says Ann Flynn, the director of education technology partnerships for the National School Boards Association in Alexandria, Va.

> The study found that the more hours teachers had spent in training, the more prepared they felt to use computers and the Internet for instruction.

So far, teachers say, schools aren't doing enough to fill that void. In a report last September from the National Center for Education Statistics, "Teachers' Tools for the 21st Century," 82 percent of teachers said they were not given enough time outside their regular teaching duties to learn, practice, or plan how to use computers and other technologies.

What's more, when asked how much time they spent in technology-related professional development during a three-year period just prior to 1999, 10 percent of teachers reported having spent no time at all, and 43 percent reported just one to eight hours of training over the three-year period. Only 12 percent said they had received more than 32 hours of training.

Yet the study found that the more hours teachers had spent in training, the more prepared they felt to use computers and the Internet for instruction.

Experts point to subtle signs that schools are making headway. According to MDR, the percentage of teachers rated as having "beginner" technology skills—meaning they are just learning how to use basic programs such as word processing software—appears to be dropping. Last year, 28 percent of schools reported that a majority of their teachers were at the beginner level, compared with 35 percent of schools in 1999.

Also, MDR found that spending for professional development increased by 3 percent between 1999 and 2000, with schools estimating they would spend roughly 17 percent of their technology funding on staff development.

But in a 2001 poll of the 50 states, *Education Week* found that states' requirements for technology-related training were sometimes few and far between for teachers:

- Twenty-six states require teachers to have technology training before being licensed to teach.

- Only Idaho, Michigan, and North Carolina require a technology test for prospective teachers.

- Of the 20 states that require schools or districts to set aside time for professional development for teachers, just Arkansas, Florida, Tennessee, and West Virginia have such a requirement for technology-related professional development.

- While 38 states have recertification requirements for teachers, only Connecticut, Georgia, North Carolina, and Virginia include technology as a part of those requirements.

A number of organizations, led by the International Society for Technology in Education, based in Eugene, Ore., are taking part in the Technology Standards for School Administrators Collaborative, which is focusing on establishing standards for what superintendents and principals should know and be able to do in technology.

The group has drawn up a set of standards that is scheduled to be released in October. A draft of the standards was released in March of this year.

A number of states are also offering professional or financial incentives to teachers and administrators to encourage them to use technology—15 states for teachers and 11 for administrators. The incentives vary by state, ranging from paying for educators to take technology classes to buying hardware and software for them to use. South Dakota, for example, has a two-week, all-expenses-paid "technology" summer academy for administrators.

How Technology Is Used

In an *Education Week* /MDR/Harris Interactive survey conducted nationwide earlier this year, students in grades 7-12 were asked about what types of tasks they use computers for in school.

While 96 percent of the respondents use school computers for research, and 91 percent to write papers, only 60 percent use computers to help them visualize concepts they are studying in class. And while 62 percent have used school computers to do homework, a somewhat smaller proportion—44 percent—said they used them to get help on homework. Twenty percent reported using computers to take exams.

"It's not sufficient that kids know how to use the equipment," says Cheryl Lemke, the chief executive officer of the Metiri Group, a national learning-technologies consulting firm in Los Angeles. "The important thing is can they use it in a meaningful, productive way that solves problems for them, so it becomes one of the tools in their repertoire?"

As is the case in other areas, how computers are used has a lot to do with the level of poverty in a school.

The NCES study, for instance, found that 51 percent of teachers who have computers at school reported assigning students to use the Internet to conduct class research. However, that figure drops to 35 percent in schools where 71 percent or more of the students are eligible for free or reduced-price lunches. In schools where fewer than 11 percent of students are eligible for subsidized lunches, the proportion of teachers making such assignments is 61 percent.

In efforts to level the playing field, more states have set standards for what students should know about using technology. In a 2001 poll of the 50 states, *Education Week* found that 35 states have standards for students that include technology.

But the breadth and depth of which states have incorporated technology into their standards varies. Some states give technology a brief mention, but not much else. Missouri, for instance, has a cursory reference to technology in its science standards, but that's it. Other states—Virginia, for example—have separate standards that specifically address technology. Maryland has taken yet another route by integrating technology expectations into the standards that cover core academic areas.

> In efforts to level the playing field, more states have set standards for what students should know about using technology.

States are also making attempts to assess how well students are using technology. In its poll of the 50 states, *Education Week* found that Florida, North Carolina, Pennsylvania, and Virginia are using statewide assessments to gauge students' technology knowledge and skills.

As more states look for ways to assess students' technology skills, the question arises: What are teachers already doing to help youngsters acquire those skills?

The *Education Week* /MDR/Harris Interactive survey sheds some light on that question. When asked about the types of tasks their teachers had demonstrated, 89 percent of the students responding said a teacher had demonstrated how to do research, and 86 percent said a teacher had shown them how to use computers to write papers. About half the students surveyed reported that a teacher had demonstrated how to use technology to help them visualize new concepts.

New data from MDR also reveal that teachers are using technology more and more for a variety of tasks. In 76 percent of schools, a majority (50 percent or more) of teachers are using computers daily for planning or teaching; in 63 percent of schools, a majority of teachers are using the Internet for instruction; and 77 percent of schools reported that a majority of their teachers have e-mail addresses—up from 39 percent in 1998.

Technology advocates acknowledge that progress is being made. But they say schools need to do a better job addressing the human factors, such as training teachers and figuring out how technology fits within the standards movement.

Keith Krueger, the executive director of the Consortium for School Networking, a Washington-based nonprofit group that promotes the use of telecommunications to improve learning, says that until those issues are dealt with, technology "is not going to ... have the fundamental impact on school reform that we need—it will just be a separate activity instead of a core function."

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Read the NCES report, "Teachers' Tools for the 21st Century," Sept. 8, 2000.

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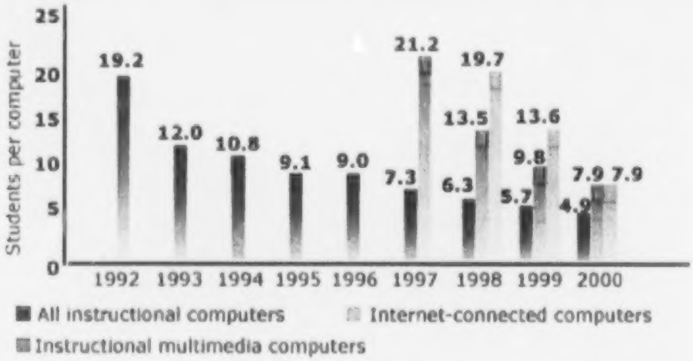
STATE DATA TABLES

Improving Picture

The number of students per instructional computer dropped to below five last year. But the biggest improvement in access was made in the number of students per Internet-connected computer, which dropped to 7.9 in 2000.



NOTES: Multimedia computers have a sound card and a CD- ROM drive. Internet-connected computers include both instructional and noninstructional computers.

SOURCE: Market Data Retrieval, "Technology in Education 2000," and published tabulations from earlier MDR surveys

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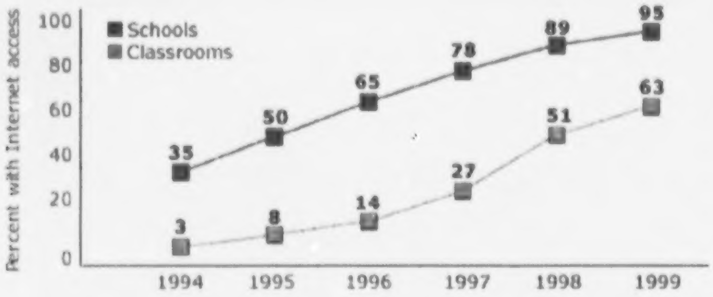
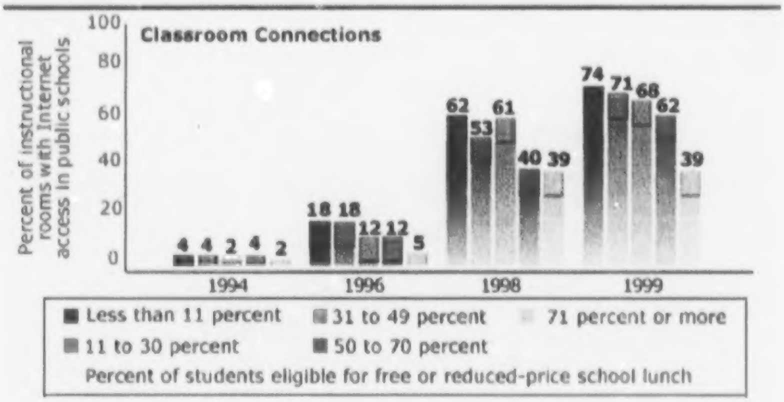
The New Divides

STATE DATA TABLES

A Classroom Divide

Almost all schools in the country now have Internet access. Yet while 63 percent of classrooms are wired, a divide exists between the haves and have-nots. In schools where 71 percent or more of the students are eligible for free or reduced-price school lunch, 39 percent of classrooms are wired, compared with 74 percent of classrooms in schools where fewer than 11 percent of students are eligible for subsidized lunch.





SOURCE: U.S. Department of Education, National Center for Education Statistics, Advanced Telecommunications in U.S. Public Schools surveys, 1994-99

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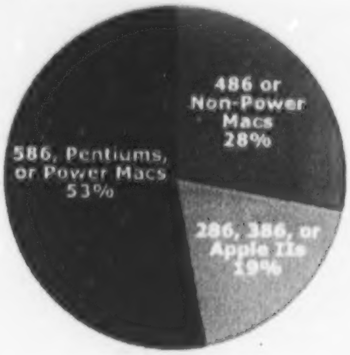
STATE DATA TABLES

More Sophisticated Hardware

Fifty-three percent of schools' inventories are 586, Pentiums, or Power MacsÑmachines with more sophisticated processors. A large jump from 1999 to 2000 in the percentage of Pentium IIs and higher-level machines indicates schools are making headway in improving the quality of hardware available to students.



SOURCE: Market Data Retrieval, unpublished tabulations from 1999-00 School Technology Survey

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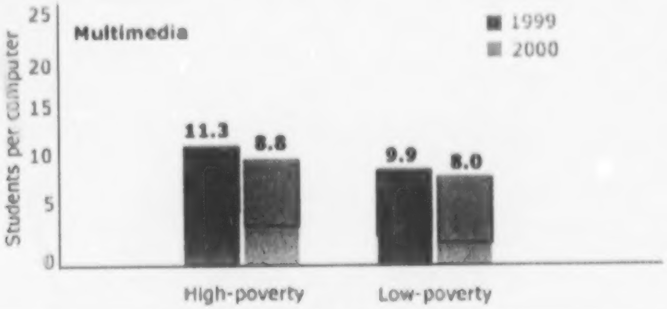
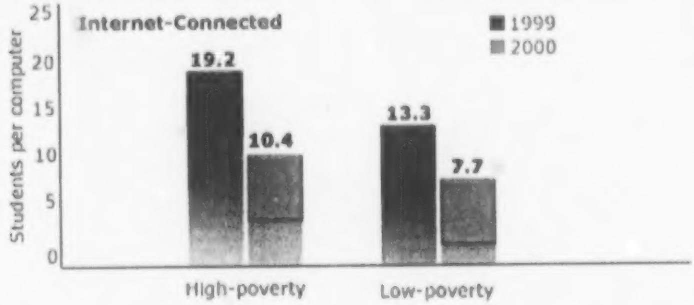
Closing the Gap

Access to multimedia and Internet-connected computers is improving in schools of all socioeconomic levels.





NOTES: High-poverty is defined as schools where more than 50 percent of the students are eligible for the federal free and reduced-priced lunch program. Low-poverty is defined as schools where 50 percent or fewer of the students are eligible for subsidized lunches.

SOURCE: Market Data Retrieval unpublished tabulations from 1999-00 School Technology Survey and 1998-99 School Technology Survey

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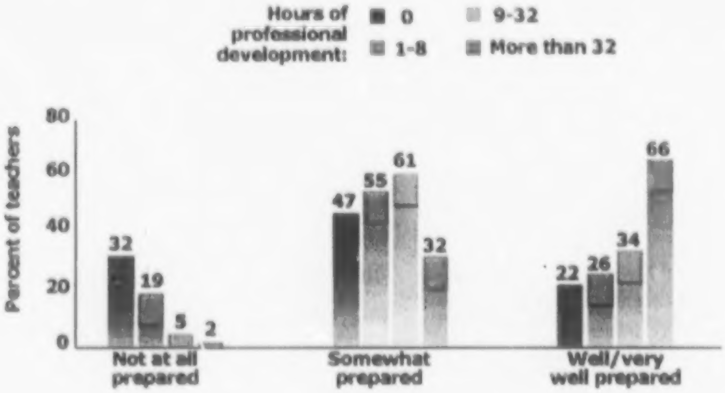
Feeling Prepared

A recent survey found that the more time teachers spent in professional development over a three-year period, the more prepared they felt to use computers and the Internet for instruction.



NOTE: Numbers may not add up to 100 because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Public School Teachers Use of Computers and the Internet," 1999

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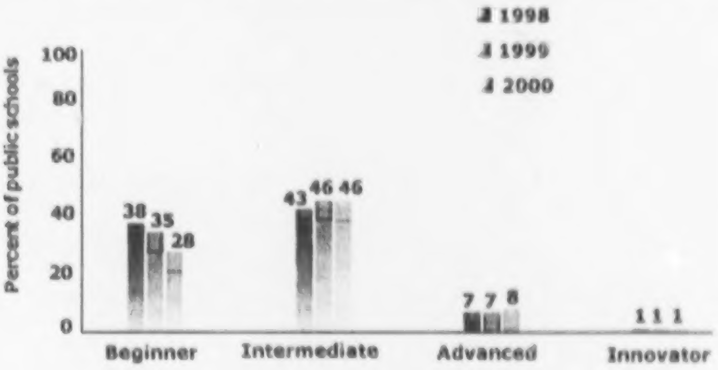
Teacher Skill Level

In a recent survey, fewer schools categorized a majority (50 percent or more) of their teachers as beginners than in previous years. Yet few schools report a majority of their teachers are advanced or innovative technology users.



SOURCE: Market Data Retrieval, "Technology in Education 2000"

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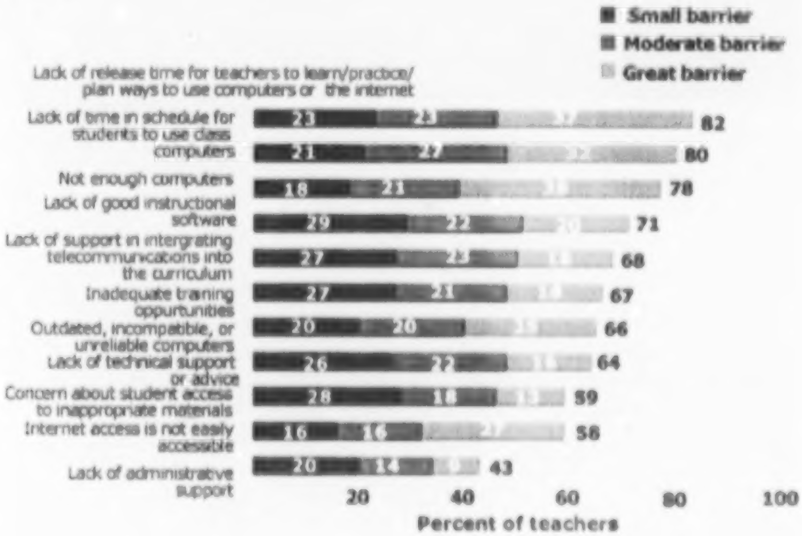
Barriers to Using Technology

Teachers cite lack of time as the greatest barrier to using computers or the Internet in instruction. Eighty-two percent mentioned insufficient release time for training, practicing, or planning as the greatest barrier, and another 80 percent of teachers cited a lack of time for students to use computers during class.



NOTES: Teachers who reported that computers were not available to them anywhere in the school were excluded from the analyses presented in this figure. Numbers may not add up to total because of rounding.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Public School Teachers Use of Computers and the Internet," 1999

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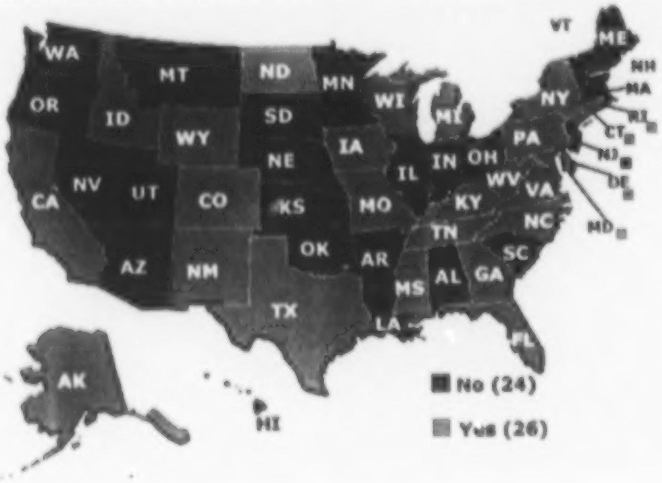
Teacher Technology Requirements?

A number of states have technology requirements in place that teachers must meet prior to initial licensure, but they vary in breadth and scope. Some states have established standards for what teachers should learn and know, while others specify a number of technology courses that must be completed before teachers are certified.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No (24)
Yes (26)

SOURCE: *Education Week* survey of state departments of education, 2001

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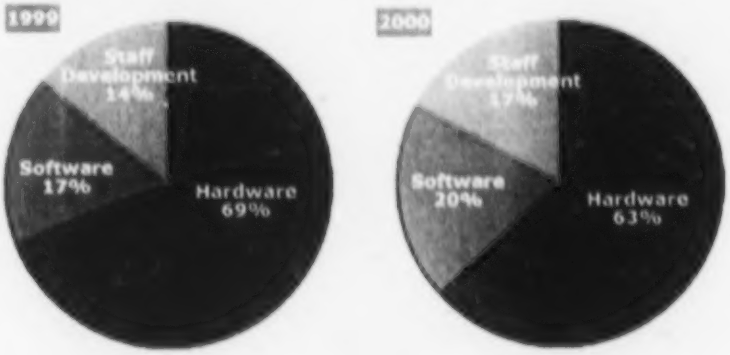
A Shift in Spending

According to a recent survey, expenditures by schools are shifting from hardware to training and software purchases. Schools estimated that spending for staff development and software would both increase by 3 percent in 2000.



SOURCE: Market Data Retrieval, "Technology in Education 1999" and "Technology in Education 2000"

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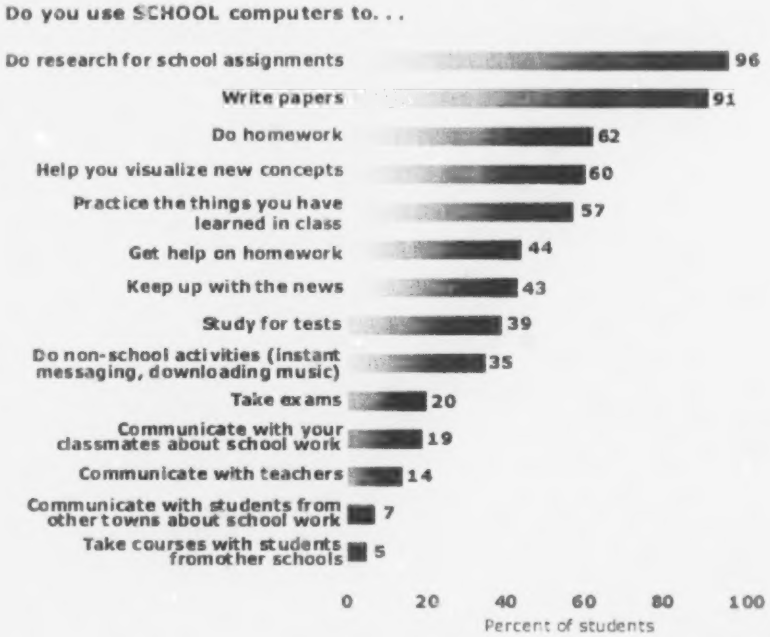
Students Report on Technology Use

In a 2001 poll of 500 students in grades 7-12, students were asked about the types of activities they use computers for in school and how their teachers use computers to help them learn. Nearly all students reported using computers for research or to write papers. Similarly, 89 percent of students reported that a teacher had demonstrated how to use a computer to do research, and 86 percent had a teacher show them how to write a paper using a computer.



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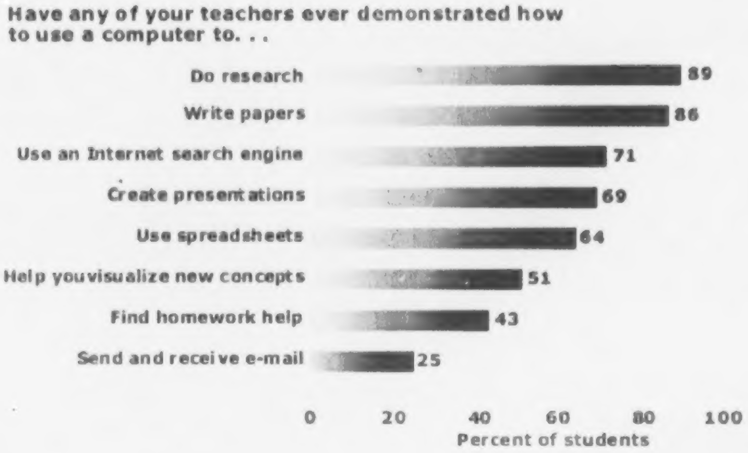

SOURCE: *Education Week* /MDR/Harris Interactive Poll of Students and Technology, 2001

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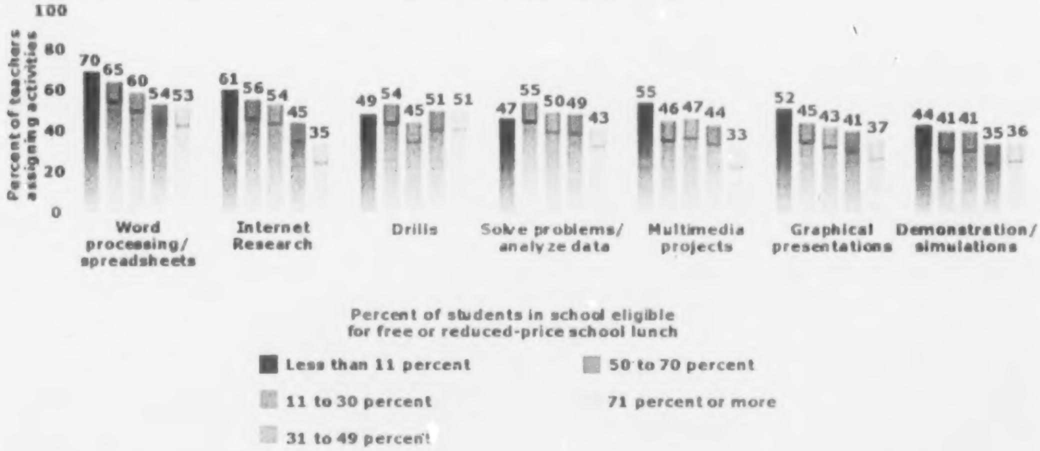
Digital Differences

When teachers were asked how they infused technology into classroom learning, teachers from higher-poverty schools responded differently. Sixty-one percent of teachers in the lowest-poverty schools reported having students do Internet research, yet only 35 percent of teachers in the highest-poverty schools reported the same.



NOTE: Teachers who reported that computers were not available to them anywhere in the school were excluded from the analyses presented in this table.

SOURCE: U.S. Department of Education, National Center for Education Statistics, Fast Response Survey System, "Public School Teachers Use of Computers and the Internet," 1999

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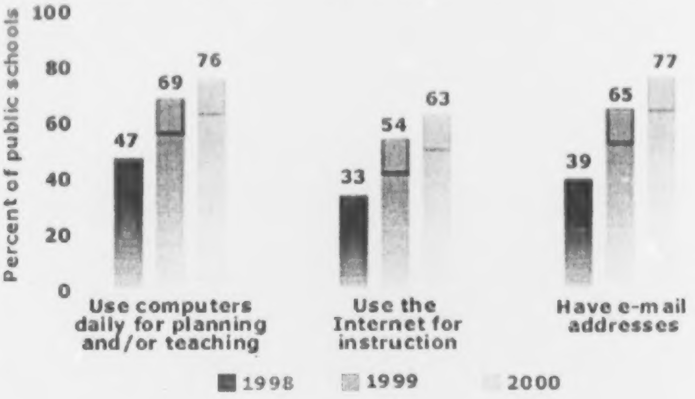
Rise in Use by Teachers

The percent of schools reporting that a majority (50 percent or more) of their teachers...



SOURCE: Market Data Retrieval, unpublished tabulations from 1999-00 School Technology Survey and earlier surveys

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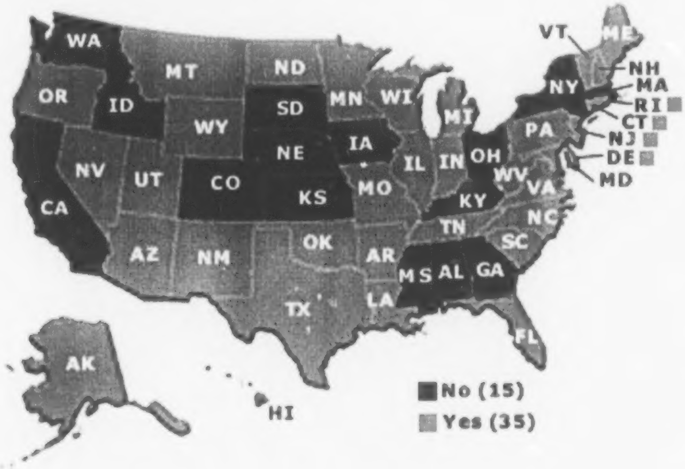
Student Technology Standards?

A number of states have incorporated technology standards for students into their lists of other core academic standards. The technology standards range from what students need to know about using specific technology tools to understanding how technology can be used to master core academic subjects.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■ No (15)
▨ Yes (35)

SOURCE: *Education Week* survey of state departments of education, 2001

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STATE DATA TABLES

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Note: N/A Data not available.

Access to Technology

	Students per instructional computer in ... (2000)				
	Statewide	**High-poverty schools**	**Low-poverty schools**	**High-minority-enrollment schools**	**Low-minority-enrollment schools**
Alabama	5.0	5.8	4.7	5.5	4.7
Alaska	3.7	2.6	3.9	2.5	4.1
Arizona	4.8	N/A	N/A	5.1	5.8
Arkansas	5.1	5.0	5.3	5.2	5.2
California	7.2	7.2	7.2	7.4	6.7
Colorado	4.6	5.1	4.5	4.7	4.5
Connecticut	5.4	5.9	5.3	4.3	5.6
Delaware	4.4	8.8	3.9	6.9	3.9
District of Columbia	5.8	5.5	5.2	5.4	6.1
Florida	4.2	4.2	4.3	4.6	4.2
Georgia	4.7	4.7	4.8	4.8	4.7
Hawaii	5.8	5.0	6.4	6.2	5.5
Idaho	3.8	3.6	3.8	N/A	N/A
Illinois	4.9	N/A	N/A	6.3	4.7
Indiana	3.7	4.6	3.6	4.3	3.6
Iowa	3.8	5.4	3.8	8.2	3.8
Kansas	3.3	3.7	3.3	3.9	3.3
Kentucky	4.2	4.7	4.1	5.2	4.3
Louisiana	6.8	6.4	7.2	6.5	7.0
Maine	4.6	5.4	5.0	1.7	4.7
Maryland	5.6	5.6	5.8	5.7	5.8
Massachusetts	5.2	N/A	N/A	5.4	5.3
Michigan	5.1	7.0	5.0	7.5	4.9
Minnesota	4.2	4.8	4.3	5.4	4.2
Mississippi	6.4	6.5	6.5	6.8	6.2
Missouri	4.5	4.3	4.5	4.5	4.5
Montana	3.1	2.2	4.7	2.3	4.8
Nebraska	3.7	2.6	3.8	2.5	3.8
Nevada	6.1	8.6	6.3	8.5	5.9

New Hampshire	6.1	N/A	N/A	N/A	N/A
New Jersey	4.6	4.0	4.8	4.5	4.6
New Mexico	4.9	N/A	N/A	4.8	5.1
New York	5.3	7.7	4.7	7.7	4.6
North Carolina	5.2	5.0	5.3	5.3	5.2
North Dakota	3.6	2.7	3.7	2.7	3.7
Ohio	4.4	4.5	4.4	4.7	4.5
Oklahoma	4.6	4.7	4.9	5.2	4.8
Oregon	5.2	5.8	5.3	13.4	5.3
Pennsylvania	4.6	N/A	N/A	5.5	4.4
Rhode Island	6.5	7.0	6.3	6.7	6.3
South Carolina	5.0	4.4	5.1	4.8	5.0
South Dakota	3.2	2.0	3.4	2.4	3.3
Tennessee	5.4	N/A	N/A	7.3	5.3
Texas	4.3	4.5	4.2	4.6	4.0
Utah	5.5	4.5	5.3	5.4	5.3
Vermont	4.9	2.4	5.0	N/A	N/A
Virginia	4.7	4.0	4.8	4.3	4.8
Washington	4.7	N/A	N/A	4.5	4.7
West Virginia	3.9	4.3	3.7	4.7	3.8
Wisconsin	3.7	4.0	3.8	4.0	3.8
Wyoming	3.0	2.0	3.5	N/A	N/A
U.S.	**4.9**	**5.3**	**4.7**	**5.5**	**4.6**

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STATE DATA TABLES

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Note: N/A Data not available.

Access to Technology						
	Students per instructional computer located in ... (2000)			Percent of instructional computers that are ... (2000)		
	Classrooms	Computer labs	Library/media centers	286,386, or Apple IIS	486 or non-Power Macs	586, Pentium II, or Power Macs
Alabama	12.4	19.0	92.9	25	20	55
Alaska	7.0	12.7	69.0	16	39	46
Arizona	11.4	16.5	103.7	18	31	52
Arkansas	13.3	13.4	71.9	27	23	50
California	14.5	23.8	136.0	20	31	49
Colorado	11.4	14.5	66.8	17	35	48
Connecticut	11.4	21.0	66.4	15	23	62
Delaware	7.2	16.3	86.7	8	15	77
District of Columbia	14.6	21.0	90.4	20	36	44
Florida	8.4	18.8	87.6	19	34	47
Georgia	9.8	17.8	77.1	21	29	50
Hawaii	10.1	22.8	91.0	15	38	47
Idaho	8.6	15.1	65.5	20	19	60
Illinois	13.2	14.8	75.7	18	24	58
Indiana	8.8	12.4	72.0	19	29	53
Iowa	9.6	10.9	56.3	19	32	49
Kansas	8.1	10.8	49.9	20	31	49
Kentucky	10.0	13.1	68.7	23	33	44
Louisiana	15.0	16.0	102.2	28	23	48
Maine	10.3	15.0	74.7	12	40	48
Maryland	17.6	12.1	71.6	22	25	53
Massachusetts	12.8	18.1	77.3	19	30	51
Michigan	14.3	15.6	70.5	16	25	58
Minnesota	12.8	11.2	58.3	17	32	51
Mississippi	14.2	16.5	97.9	25	24	51
Missouri	10.9	12.5	64.7	17	27	56
Montana	8.7	11.8	57.2	23	28	49
Nebraska	9.6	9.7	52.4	21	31	48

Nevada	14.1	19.4	121.7	15	31	54
New Hampshire	13.2	21.0	73.8	21	30	49
New Jersey	11.8	15.4	74.3	13	24	63
New Mexico	11.0	14.3	89.6	20	26	54
New York	11.7	17.9	96.1	19	25	56
North Carolina	13.0	16.1	79.5	25	30	45
North Dakota	8.8	10.8	57.8	21	28	50
Ohio	8.9	16.9	79.5	12	17	71
Oklahoma	11.3	11.5	59.4	21	27	52
Oregon	12.3	16.4	62.6	15	34	51
Pennsylvania	11.5	13.1	86.6	18	25	56
Rhode Island	14.3	17.4	104.4	19	34	47
South Carolina	10.8	16.5	53.6	20	21	59
South Dakota	8.2	8.4	49.7	20	28	52
Tennessee	10.5	24.9	105.5	21	32	47
Texas	10.9	13.7	91.0	14	29	57
Utah	15.2	12.2	80.4	20	25	55
Vermont	8.6	19.0	92.4	12	33	55
Virginia	10.7	15.2	77.2	18	26	56
Washington	11.3	16.9	59.9	18	39	43
West Virginia	8.7	11.4	84.6	28	21	51
Wisconsin	12.1	11.4	50.7	15	27	58
Wyoming	8.1	8.4	40.4	22	34	44
U.S.	**11.3**	**15.3**	**78.6**	**19**	**28**	**53**

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Note: N/A Data not available.

Access to Technology					
	Students per instructional multimedia computer in ... (2000)				
	Statewide	High-poverty schools	Low-poverty schools	High-minority-enrollment schools	Low-minority-enrollment schools
Alabama	8.9	9.3	9.2	8.1	9.6
Alaska	7.2	4.4	7.8	4.0	8.8
Arizona	9.6	N/A	N/A	9.3	12.5
Arkansas	8.7	8.9	8.6	9.3	8.5
California	11.9	12.8	12.3	12.9	11.8
Colorado	8.2	9.3	8.0	9.3	7.9
Connecticut	8.4	12.7	7.8	6.8	8.8
Delaware	5.8	11.6	5.3	9.3	5.3
District of Columbia	11.3	13.8	9.7	13.0	6.1
Florida	7.7	7.2	8.5	8.0	8.2
Georgia	7.4	7.6	7.9	8.0	7.6
Hawaii	10.6	7.6	14.6	12.0	20.3
Idaho	7.0	19.9	6.8	N/A	N/A
Illinois	8.0	N/A	N/A	11.2	7.4
Indiana	6.9	9.2	6.8	10.2	6.8
Iowa	6.7	10.5	6.7	16.9	6.8
Kansas	5.6	6.5	5.8	10.8	5.6
Kentucky	8.3	9.9	8.2	7.9	8.7
Louisiana	10.3	9.7	11.3	10.2	10.7
Maine	8.1	11.1	8.9	5.0	8.2
Maryland	9.5	16.8	10.1	14.3	9.2
Massachusetts	8.5	N/A	N/A	8.3	9.1
Michigan	7.7	11.2	7.4	10.5	7.5
Minnesota	7.4	8.9	7.8	10.1	7.7
Mississippi	9.3	10.7	11.0	10.8	10.9
Missouri	6.7	8.3	7.1	7.6	7.2
Montana	6.7	2.8	9.9	3.5	9.7
Nebraska	7.1	4.6	7.7	4.7	7.6

Nevada	8.9	10.9	9.5	10.7	9.4
New Hampshire	10.0	N/A	N/A	N/A	N/A
New Jersey	6.0	4.9	6.7	6.0	6.3
New Mexico	8.5	N/A	N/A	8.4	8.8
New York	8.3	11.4	7.6	12.4	7.3
North Carolina	10.5	10.6	10.7	11.6	10.4
North Dakota	7.6	4.6	8.2	4.9	8.2
Ohio	5.8	6.2	6.0	7.1	6.0
Oklahoma	7.4	7.6	8.8	7.7	8.5
Oregon	9.3	8.9	9.6	9.7	9.6
Pennsylvania	7.1	N/A	N/A	10.7	6.7
Rhode Island	10.7	9.4	12.1	9.1	12.1
South Carolina	7.3	6.2	8.1	7.6	7.4
South Dakota	4.9	2.0	5.6	4.2	4.9
Tennessee	9.0	N/A	N/A	12.3	9.2
Texas	7.0	7.7	7.0	7.8	6.7
Utah	10.1	8.3	10.8	11.1	10.6
Vermont	7.9	9.0	8.5	N/A	N/A
Virginia	7.1	5.9	7.9	6.6	7.9
Washington	9.9	N/A	N/A	9.0	10.4
West Virginia	7.0	8.3	7.2	20.3	7.3
Wisconsin	6.7	7.4	6.7	7.0	6.9
Wyoming	5.8	2.5	5.8	N/A	N/A
U.S.	**7.9**	**8.8**	**8.0**	**9.4**	**7.9**

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Note: N/A Data not available.

Access to Technology

	Students per Internet-connected computer in ... (2000)				
	Statewide	**High-poverty schools**	**Low-poverty schools**	**High-minority-enrollment schools**	**Low-minority-enrollment schools**
Alabama	11.6	13.4	11.6	11.6	11.9
Alaska	4.8	3.4	4.9	3.0	5.5
Arizona	6.1	N/A	N/A	3.8	10.8
Arkansas	8.1	9.7	7.8	11.5	7.6
California	12.4	15.2	11.8	14.7	11.3
Colorado	8.0	9.4	7.8	7.9	8.0
Connecticut	8.9	21.6	8.0	7.3	9.2
Delaware	5.1	10.4	4.7	8.5	4.6
District of Columbia	12.6	14.3	16.5	14.9	16.3
Florida	9.0	11.4	8.9	11.5	8.8
Georgia	8.3	10.7	9.6	11.3	9.5
Hawaii	8.8	6.5	10.2	9.8	7.5
Idaho	6.5	12.6	6.4	N/A	N/A
Illinois	7.8	N/A	N/A	16.2	6.8
Indiana	6.8	14.8	6.4	15.9	6.5
Iowa	5.6	15.6	5.6	23.9	5.7
Kansas	6.0	8.7	5.9	9.8	5.9
Kentucky	7.1	8.0	7.0	20.0	7.2
Louisiana	11.4	10.6	12.8	12.0	11.6
Maine	6.2	7.4	6.2	2.5	6.2
Maryland	9.0	11.8	9.3	11.8	8.6
Massachusetts	9.0	N/A	N/A	8.2	9.7
Michigan	8.7	12.9	8.4	14.7	8.3
Minnesota	6.2	10.9	6.2	12.2	6.1
Mississippi	11.1	12.7	12.4	12.7	12.5
Missouri	6.6	6.4	7.1	8.9	6.8
Montana	6.9	6.1	8.9	6.6	8.8
Nebraska	5.1	3.9	5.3	4.2	5.2

Nevada	11.3	12.2	11.9	11.9	11.8
New Hampshire	10.4	N/A	N/A	N/A	N/A
New Jersey	8.9	12.3	8.8	12.0	8.2
New Mexico	9.3	N/A	N/A	10.0	8.6
New York	9.8	15.1	8.8	16.6	8.4
North Carolina	11.0	11.2	11.3	12.7	10.8
North Dakota	5.7	6.6	5.9	6.8	5.9
Ohio	4.9	7.0	4.8	7.3	4.9
Oklahoma	7.0	6.9	8.6	6.1	8.6
Oregon	8.1	8.5	8.4	23.1	8.4
Pennsylvania	8.8	N/A	N/A	19.5	8.1
Rhode Island	9.6	10.2	10.8	10.4	10.8
South Carolina	7.1	6.3	7.8	7.4	7.5
South Dakota	4.6	2.2	5.0	2.7	4.8
Tennessee	9.0	N/A	N/A	12.3	8.9
Texas	7.3	8.6	7.1	8.7	6.6
Utah	7.7	6.3	8.1	4.7	8.1
Vermont	6.4	2.4	7.3	N/A	N/A
Virginia	7.5	7.0	8.3	8.1	8.0
Washington	7.5	N/A	N/A	7.3	8.2
West Virginia	6.3	9.4	6.5	7.7	6.9
Wisconsin	6.7	11.8	6.4	10.2	6.6
Wyoming	4.9	3.3	5.0	N/A	N/A
U.S.	**7.9**	**10.4**	**7.7**	**10.5**	**7.6**

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Note: N/A Data not available.

Access to Technology

	Percent of schools with Internet access (2000)				
	Statewide	**High-poverty schools**	**Low-poverty schools**	**High-minority-enrollment schools**	**Low-minority-enrollment schools**
Alabama	89	86	92	86	91
Alaska	98	100	98	98	98
Arizona	90	N/A	N/A	93	91
Arkansas	97	93	99	91	99
California	91	89	92	90	91
Colorado	97	98	98	98	98
Connecticut	96	95	97	93	96
Delaware	100	100	100	100	100
District of Columbia	91	88	100	90	100
Florida	96	97	96	96	96
Georgia	96	96	100	96	99
Hawaii	100	100	100	100	100
Idaho	98	89	99	N/A	N/A
Illinois	90	N/A	N/A	83	93
Indiana	94	91	95	86	96
Iowa	95	94	96	100	95
Kansas	96	94	98	100	97
Kentucky	94	93	98	67	95
Louisiana	88	85	92	83	92
Maine	98	95	98	100	98
Maryland	94	95	94	96	92
Massachusetts	91	N/A	N/A	95	92
Michigan	93	90	94	88	94
Minnesota	98	97	98	94	98
Mississippi	88	89	89	89	89
Missouri	95	85	97	83	96
Montana	95	93	95	100	94
Nebraska	100	93	100	100	99

Nevada	82	75	86	86	84
New Hampshire	96	N/A	N/A	N/A	N/A
New Jersey	92	92	93	91	94
New Mexico	86	N/A	N/A	82	92
New York	90	83	94	83	94
North Carolina	97	95	98	96	97
North Dakota	94	80	96	67	96
Ohio	92	89	93	89	93
Oklahoma	89	88	90	86	90
Oregon	96	96	96	100	96
Pennsylvania	90	N/A	N/A	98	90
Rhode Island	91	67	95	60	93
South Carolina	97	98	98	98	98
South Dakota	92	88	93	100	92
Tennessee	98	N/A	N/A	98	99
Texas	95	93	97	95	96
Utah	99	100	99	100	99
Vermont	100	100	100	N/A	N/A
Virginia	97	95	97	95	97
Washington	96	N/A	N/A	93	96
West Virginia	98	97	100	100	99
Wisconsin	98	93	98	93	98
Wyoming	96	100	97	N/A	N/A
U.S.	**94**	**92**	**96**	**91**	**95**

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Note: N/A Data not available.

Access to Technology					
	Percent of schools with Internet access from one or more classrooms (2000)				
	Statewide	High-poverty schools	Low-poverty schools	High-minority-enrollment schools	Low-minority-enrollment schools
Alabama	70	66	72	67	71
Alaska	93	96	93	89	97
Arizona	80	N/A	N/A	74	84
Arkansas	74	60	80	56	79
California	79	73	82	74	84
Colorado	84	72	87	75	87
Connecticut	75	60	79	58	79
Delaware	100	100	100	100	100
District of Columbia	83	90	75	85	100
Florida	79	79	80	79	81
Georgia	77	71	80	74	77
Hawaii	91	100	88	95	50
Idaho	92	88	92	N/A	N/A
Illinois	80	N/A	N/A	57	86
Indiana	86	68	88	63	87
Iowa	90	69	91	50	91
Kansas	83	77	84	81	83
Kentucky	90	89	91	50	90
Louisiana	82	80	85	77	85
Maine	94	89	93	100	93
Maryland	75	61	77	71	77
Massachusetts	77	N/A	N/A	75	79
Michigan	78	69	79	64	80
Minnesota	93	82	94	79	94
Mississippi	75	72	81	68	83
Missouri	81	67	83	48	84
Montana	86	93	86	100	86
Nebraska	93	79	94	75	94

Nevada	88	83	88	91	88
New Hampshire	85	N/A	N/A	N/A	N/A
New Jersey	76	77	75	75	77
New Mexico	84	N/A	N/A	82	88
New York	74	70	75	67	76
North Carolina	72	72	73	64	76
North Dakota	94	100	93	75	94
Ohio	90	87	91	88	90
Oklahoma	76	73	76	70	76
Oregon	89	79	91	100	89
Pennsylvania	72	N/A	N/A	49	75
Rhode Island	85	100	82	100	83
South Carolina	92	93	92	91	93
South Dakota	91	86	93	89	92
Tennessee	94	N/A	N/A	83	97
Texas	83	76	86	78	86
Utah	92	89	93	100	93
Vermont	95	100	97	N/A	N/A
Virginia	85	83	85	81	87
Washington	88	N/A	N/A	78	88
West Virginia	91	88	94	N/A	N/A
Wisconsin	83	46	86	48	87
Wyoming	91	100	91	N/A	N/A
U.S.	**82**	**76**	**85**	**73**	**85**

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Note: N/A Data not available.

Access to Technology			
	Among schools with at least one classroom connected to the Internet, the percent of classrooms with Internet access (2000)	Percent of schools that make computers available to ... (2000)	
		Students after school hours	Parents/community members
Alabama	79	86	63
Alaska	84	97	94
Arizona	83	95	76
Arkansas	73	85	72
California	72	94	75
Colorado	85	92	69
Connecticut	69	91	69
Delaware	99	100	100
District of Columbia	50	100	60
Florida	76	96	80
Georgia	80	92	66
Hawaii	68	100	75
Idaho	90	100	67
Illinois	77	92	72
Indiana	85	90	69
Iowa	90	94	70
Kansas	84	92	71
Kentucky	91	92	67
Louisiana	63	89	66
Maine	88	88	75
Maryland	72	97	64
Massachusetts	73	97	74
Michigan	77	95	73
Minnesota	90	95	80
Mississippi	70	88	59
Missouri	78	97	78
Montana	82	93	79
Nebraska	91	93	67

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Nevada	90	93	64
New Hampshire	78	95	58
New Jersey	72	94	77
New Mexico	67	94	80
New York	63	92	61
North Carolina	74	93	59
North Dakota	83	92	65
Ohio	88	94	71
Oklahoma	70	92	73
Oregon	88	92	66
Pennsylvania	68	94	76
Rhode Island	74	100	75
South Carolina	90	88	66
South Dakota	95	97	70
Tennessee	84	97	65
Texas	81	93	67
Utah	94	94	59
Vermont	89	90	71
Virginia	89	88	61
Washington	90	99	74
West Virginia	77	90	87
Wisconsin	84	91	76
Wyoming	88	93	86
U.S.	**80**	**93**	**71**

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Note: N/A Data not available.

Access to Technology					
	Of those schools with Internet access, the percent that connect through a T1 or cable modem (2000)				
	Statewide	High-poverty schools	Low-poverty schools	High-minority-enrollment schools	Low-minority-enrollment schools
Alabama	51	54	51	58	49
Alaska	56	46	59	41	67
Arizona	73	N/A	N/A	71	74
Arkansas	69	69	69	62	71
California	59	59	60	60	59
Colorado	74	92	72	90	71
Connecticut	50	35	53	36	53
Delaware	98	100	100	100	100
District of Columbia	86	89	88	88	100
Florida	67	65	68	63	69
Georgia	65	60	67	62	65
Hawaii	76	67	79	76	67
Idaho	63	50	64	N/A	N/A
Illinois	71	N/A	N/A	64	73
Indiana	69	67	69	56	70
Iowa	77	60	77	N/A	N/A
Kansas	59	67	59	76	58
Kentucky	72	66	77	33	71
Louisiana	58	61	54	64	54
Maine	69	50	74	50	71
Maryland	61	41	66	56	66
Massachusetts	52	N/A	N/A	59	50
Michigan	57	46	60	43	60
Minnesota	81	78	81	67	82
Mississippi	69	64	71	65	70
Missouri	75	73	76	68	76
Montana	36	36	33	71	30
Nebraska	77	70	78	75	78

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Nevada	48	33	47	36	48
New Hampshire	45	N/A	47	N/A	N/A
New Jersey	61	42	65	49	66
New Mexico	66	N/A	N/A	69	60
New York	64	56	66	57	66
North Carolina	59	50	61	52	62
North Dakota	52	60	52	67	52
Ohio	82	72	83	65	83
Oklahoma	70	68	71	69	70
Oregon	72	53	74	N/A	N/A
Pennsylvania	66	N/A	N/A	47	68
Rhode Island	57	67	56	N/A	N/A
South Carolina	81	82	83	80	83
South Dakota	68	78	70	63	71
Tennessee	38	N/A	N/A	39	38
Texas	77	70	79	71	80
Utah	82	61	86	80	83
Vermont	34	100	33	N/A	N/A
Virginia	67	75	66	77	67
Washington	76	N/A	N/A	74	77
West Virginia	73	69	75	N/A	N/A
Wisconsin	68	40	70	32	70
Wyoming	67	N/A	N/A	N/A	N/A
U.S.	**67**	**63**	**69**	**63**	**68**

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Note: N/A Data not available.

[1] North Carolina requires all preservice teachers to complete a portfolio.

Capacity To Use Technology

	State regularly conducts data collection on technology in schools (2001)	Requirements for initial teacher licensure include ... (2001)		State requires technology training as part of teacher recertification requirements (2001)
		Technology training	Passing a technology test	
Alabama	✓			
Alaska		✓		
Arizona	✓			
Arkansas	✓			
California	✓	✓		
Colorado		✓		
Connecticut	✓	✓		✓
Delaware	✓	✓		
District of Columbia	N/A	N/A	N/A	N/A
Florida	✓	✓		
Georgia	✓	✓		✓
Hawaii	✓			
Idaho	✓	✓	✓	
Illinois	✓			
Indiana	✓			
Iowa	✓	✓		
Kansas	✓			
Kentucky	✓	✓		
Louisiana	✓			
Maine	✓			
Maryland	✓	✓		
Massachusetts	✓			
Michigan		✓	✓	
Minnesota				
Mississippi	✓	✓		

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Missouri	✔	✔		
Montana	✔			
Nebraska	✔			
Nevada	✔			
New Hampshire	✔			
New Jersey	✔			
New Mexico	✔	✔		
New York	✔	✔		
North Carolina	✔	✔	✔1	✔
North Dakota	✔	✔		
Ohio	✔			
Oklahoma	✔			
Oregon	✔			
Pennsylvania	✔	✔		
Rhode Island	✔	✔		
South Carolina	✔			
South Dakota	✔			
Tennessee	✔	✔		
Texas	✔	✔		
Utah				
Vermont	✔			
Virginia	✔	✔		✔
Washington	✔			
West Virginia	✔	✔		
Wisconsin	✔	✔		
Wyoming	✔	✔		
U.S.	45	26	3	4

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Note: N/A Data not available.

Capacity To Use Technology

	State has time requirements for technology-related professional development for all teachers (2001)	State offers professional or financial incentives to use technology (2001)	
		Teachers	Administrators
Alabama			
Alaska			
Arizona			
Arkansas	✓		
California			
Colorado			
Connecticut		✓	✓
Delaware		✓	✓
District of Columbia	N/A	N/A	N/A
Florida	✓	✓	✓
Georgia			
Hawaii		✓	
Idaho			
Illinois			
Indiana		✓	✓
Iowa			
Kansas			
Kentucky			
Louisiana		✓	✓
Maine			
Maryland			
Massachusetts		✓	✓
Michigan		✓	
Minnesota			
Mississippi		✓	✓
Missouri			
Montana			
Nebraska			
Nevada			

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New Hampshire			
New Jersey		✓	✓
New Mexico			
New York			
North Carolina			
North Dakota			
Ohio		✓	
Oklahoma			
Oregon			
Pennsylvania			
Rhode Island			
South Carolina			
South Dakota		✓	✓
Tennessee	✓		
Texas			
Utah		✓	
Vermont		✓	✓
Virginia			
Washington			
West Virginia	✓	✓	✓
Wisconsin			
Wyoming			
U.S.	4	15	11

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Note: N/A Data not available.

Capacity To Use Technology					
	Percent of schools where the majority of teachers are "beginners" when it comes to using technology (2000)				
	Statewide	High-poverty schools	Low-poverty schools	High-minority-enrollment schools	Low-minority-enrollment schools
Alabama	34	35	29	41	29
Alaska	34	N/A	N/A	22	19
Arizona	34	N/A	N/A	27	37
Arkansas	34	58	31	38	37
California	34	37	26	32	30
Colorado	34	27	17	21	17
Connecticut	34	67	31	50	32
Delaware	34	N/A	N/A	N/A	N/A
District of Columbia	34	N/A	N/A	N/A	N/A
Florida	34	38	29	40	27
Georgia	34	28	13	26	16
Hawaii	34	25	33	N/A	N/A
Idaho	34	67	13	N/A	N/A
Illinois	34	N/A	N/A	42	25
Indiana	34	31	11	43	12
Iowa	34	N/A	N/A	N/A	N/A
Kansas	34	23	16	N/A	N/A
Kentucky	34	24	21	N/A	N/A
Louisiana	34	41	30	50	27
Maine	34	N/A	N/A	N/A	N/A
Maryland	34	36	23	26	28
Massachusetts	34	N/A	N/A	33	27
Michigan	34	35	29	32	30
Minnesota	34	14	21	38	19
Mississippi	34	43	40	38	50
Missouri	34	43	26	42	27
Montana	34	N/A	N/A	N/A	N/A
Nebraska	34	N/A	N/A	N/A	N/A
Nevada	34	N/A	N/A	50	32

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New Hampshire	34	N/A	N/A	N/A	N/A
New Jersey	34	44	22	42	20
New Mexico	34	N/A	N/A	36	33
New York	34	54	27	47	30
North Carolina	34	27	19	32	18
North Dakota	34	33	37	50	36
Ohio	34	47	34	45	34
Oklahoma	34	50	34	56	38
Oregon	34	25	22	N/A	N/A
Pennsylvania	34	N/A	N/A	21	25
Rhode Island	34	50	24	50	24
South Carolina	34	32	33	41	26
South Dakota	34	N/A	N/A	N/A	N/A
Tennessee	34	N/A	N/A	45	26
Texas	34	31	27	32	26
Utah	34	N/A	N/A	N/A	N/A
Vermont	34	N/A	N/A	N/A	N/A
Virginia	34	37	19	18	22
Washington	34	N/A	N/A	20	20
West Virginia	34	13	32	N/A	N/A
Wisconsin	34	33	23	23	24
Wyoming	34	N/A	N/A	N/A	N/A
U.S.	**28**	**36**	**25**	**34**	**26**

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Note: N/A Data not available.

Capacity To Use Technology

	Percent of 4th graders whose language arts teachers feel at least "moderately prepared" to use ... (1998)			Percent of 8th graders whose language arts teachers feel at least "moderately prepared" to use ... (1998)		
	Computer	Software for teaching reading	Software for teaching writing	Computer	Software for teaching reading	Software for teaching writing
Alabama	85	69	64	82	55	56
Alaska	N/A	N/A	N/A	N/A	N/A	N/A
Arizona	88	52	58	88	46	56
Arkansas	79	59	47	76	37	41
California	91	54	59	87	47	54
Colorado	93	62	63	91	49	57
Connecticut	92	59	64	83	44	56
Delaware	84	48	49	82	37	42
District of Columbia	90	63	60	87	68	72
Florida	92	76	73	91	61	66
Georgia	88	66	61	88	62	63
Hawaii	91	56	58	82	39	48
Idaho	N/A	N/A	N/A	N/A	N/A	N/A
Illinois	N/A	N/A	N/A	N/A	N/A	N/A
Indiana	N/A	N/A	N/A	N/A	N/A	N/A
Iowa	90	55	58	N/A	N/A	N/A
Kansas	88	60	55	91	48	58
Kentucky	93	59	63	90	57	62
Louisiana	81	65	57	75	51	52
Maine	87	40	51	88	42	52

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Maryland	86	59	62	88	50	59
Massachusetts	88	59	62	78	40	51
Michigan	81	53	53	N/A	N/A	N/A
Minnesota	87	49	54	94	34	55
Mississippi	82	61	46	75	48	51
Missouri	88	60	55	88	51	60
Montana	89	56	59	87	48	59
Nebraska	N/A	N/A	N/A	N/A	N/A	N/A
Nevada	87	56	57	88	44	53
New Hampshire	91	49	57	N/A	N/A	N/A
New Jersey	N/A	N/A	N/A	N/A	N/A	N/A
New Mexico	92	69	72	87	57	61
New York	82	50	53	83	42	51
North Carolina	93	67	62	94	64	65
North Dakota	N/A	N/A	N/A	N/A	N/A	N/A
Ohio	N/A	N/A	N/A	N/A	N/A	N/A
Oklahoma	82	63	54	85	53	60
Oregon	88	54	61	93	41	56
Pennsylvania	N/A	N/A	N/A	N/A	N/A	N/A
Rhode Island	77	44	52	79	33	47
South Carolina	87	68	61	87	59	58
South Dakota	N/A	N/A	N/A	N/A	N/A	N/A
Tennessee	86	64	58	79	57	55
Texas	90	65	64	90	63	65
Utah	89	53	51	95	50	63
Vermont	N/A	N/A	N/A	N/A	N/A	N/A
Virginia	93	68	71	94	60	74
Washington	92	49	56	91	47	59
West Virginia	89	73	66	78	53	51
Wisconsin	89	64	67	85	47	64
Wyoming	92	67	67	89	55	64
U.S.	**88**	**58**	**59**	**87**	**51**	**58**

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Note: N/A Data not available.

Use of Technology

	State standards for students include technology (2001)	State tests students on technology standards (2001)
Alabama		
Alaska	✔	
Arizona	✔	
Arkansas	✔	
California		
Colorado		
Connecticut	✔	
Delaware	✔	
District of Columbia	N/A	N/A
Florida	✔	✔
Georgia		
Hawaii	✔	
Idaho		
Illinois	✔	
Indiana	✔	
Iowa		
Kansas		
Kentucky		
Louisiana	✔	
Maine	✔	
Maryland	✔	
Massachusetts		
Michigan	✔	
Minnesota	✔	

Mississippi		
Missouri	✔	
Montana	✔	
Nebraska		
Nevada	✔	
New Hampshire	✔	
New Jersey	✔	
New Mexico	✔	
New York		
North Carolina	✔	✔
North Dakota	✔	
Ohio		
Oklahoma	✔	
Oregon	✔	
Pennsylvania	✔	✔
Rhode Island	✔	
South Carolina	✔	
South Dakota		
Tennessee	✔	
Texas	✔	
Utah	✔	
Vermont	✔	
Virginia	✔	✔
Washington		
West Virginia	✔	
Wisconsin	✔	
Wyoming	✔	
U.S.	35	4

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Note: N/A Data not available.

Use of Technology						
	Percent of 4th graders whose language arts teachers use computer software for reading instruction at least once or twice a week (1998)			Percent of 8th graders whose language arts teachers use computer software for reading instruction at least once or twice a week (1998)		
	Statewide	Poor	Nonpoor	Statewide	Poor	Nonpoor
Alabama	47	47	47	13	15	13
Alaska	N/A	N/A	N/A	N/A	N/A	N/A
Arizona	17	22	13	7	10	5
Arkansas	60	61	60	10	13	7
California	17	23	12	6	9	4
Colorado	15	16	15	3	3	2
Connecticut	20	35	16	3	8	2
Delaware	17	19	17	5	4	6
District of Columbia	37	41	23	20	29	10
Florida	44	46	42	7	10	6
Georgia	48	51	43	17	20	14
Hawaii	12	10	13	4	4	4
Idaho	N/A	N/A	N/A	N/A	N/A	N/A
Illinois	N/A	N/A	N/A	N/A	N/A	N/A
Indiana	N/A	N/A	N/A	N/A	N/A	N/A
Iowa	14	18	12	N/A	N/A	N/A
Kansas	33	33	31	9	10	7
Kentucky	22	21	22	12	16	8
Louisiana	44	46	42	20	21	16
Maine	10	13	8	2	3	1
Maryland	24	32	19	6	12	4

Massachusetts	16	22	14	6	3	7
Michigan	25	26	23	N/A	N/A	N/A
Minnesota	8	12	6	3	6	2
Mississippi	46	45	46	6	10	4
Missouri	23	23	23	4	3	3
Montana	14	16	13	4	5	3
Nebraska	N/A	N/A	N/A	N/A	N/A	N/A
Nevada	12	14	11	3	5	2
New Hampshire	8	10	9	N/A	N/A	N/A
New Jersey	N/A	N/A	N/A	N/A	N/A	N/A
New Mexico	32	33	31	6	6	4
New York	22	21	21	3	8	3
North Carolina	41	46	38	13	15	12
North Dakota	N/A	N/A	N/A	N/A	N/A	N/A
Ohio	N/A	N/A	N/A	N/A	N/A	N/A
Oklahoma	48	51	41	12	15	10
Oregon	15	20	14	8	14	7
Pennsylvania	N/A	N/A	N/A	N/A	N/A	N/A
Rhode Island	10	11	9	4	6	3
South Carolina	42	49	38	15	15	17
South Dakota	N/A	N/A	N/A	N/A	N/A	N/A
Tennessee	37	42	34	16	18	15
Texas	37	43	31	19	26	15
Utah	19	21	21	2	4	2
Vermont	N/A	N/A	N/A	N/A	N/A	N/A
Virginia	30	35	28	6	8	7
Washington	15	16	15	3	6	2
West Virginia	74	74	74	11	12	10
Wisconsin	14	18	11	6	14	6
Wyoming	30	36	25	4	8	3
U.S.	**26**	**34**	**20**	**8**	**11**	**7**

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Note: N/A Data not available.

Use of Technology

	Percent of 4th graders who use a computer for schoolwork at least once or twice a week (1998)			Percent of 8th graders who use a computer for schoolwork at least once or twice a week (1998)		
	Statewide	Poor	Nonpoor	Statewide	Poor	Nonpoor
Alabama	30	32	28	30	27	32
Alaska	N/A	N/A	N/A	N/A	N/A	N/A
Arizona	31	35	29	39	34	42
Arkansas	38	39	36	32	30	33
California	33	34	33	44	33	53
Colorado	34	33	34	48	34	53
Connecticut	38	41	36	48	25	52
Delaware	30	33	29	34	28	34
District of Columbia	32	33	27	36	32	42
Florida	30	35	26	32	29	34
Georgia	36	43	30	32	28	35
Hawaii	35	39	32	33	27	36
Idaho	N/A	N/A	N/A	N/A	N/A	N/A
Illinois	N/A	N/A	N/A	N/A	N/A	N/A
Indiana	N/A	N/A	N/A	N/A	N/A	N/A
Iowa	34	33	35	N/A	N/A	N/A
Kansas	43	39	43	40	32	44
Kentucky	47	46	48	37	33	40
Louisiana	35	35	33	30	28	33
Maine	29	27	31	56	41	61
Maryland	34	40	30	38	25	42
Massachusetts	36	40	35	47	33	51

Michigan	32	36	30	N/A	N/A	N/A
Minnesota	33	37	31	42	34	45
Mississippi	35	40	28	46	44	48
Missouri	28	26	28	35	31	37
Montana	28	25	30	44	40	46
Nebraska	N/A	N/A	N/A	N/A	N/A	N/A
Nevada	22	23	21	33	26	36
New Hampshire	27	20	28	N/A	N/A	N/A
New Jersey	N/A	N/A	N/A	N/A	N/A	N/A
New Mexico	28	28	27	36	29	40
New York	31	37	27	43	37	49
North Carolina	32	32	31	39	31	43
North Dakota	N/A	N/A	N/A	N/A	N/A	N/A
Ohio	N/A	N/A	N/A	N/A	N/A	N/A
Oklahoma	36	38	33	28	23	31
Oregon	28	25	28	48	38	53
Pennsylvania	N/A	N/A	N/A	N/A	N/A	N/A
Rhode Island	28	27	27	42	30	47
South Carolina	36	38	35	37	32	40
South Dakota	N/A	N/A	N/A	N/A	N/A	N/A
Tennessee	34	37	31	29	23	32
Texas	33	36	31	37	31	41
Utah	31	26	31	40	33	42
Vermont	N/A	N/A	N/A	N/A	N/A	N/A
Virginia	32	33	32	38	31	40
Washington	32	30	33	44	31	47
West Virginia	38	37	39	31	27	36
Wisconsin	36	34	38	45	33	48
Wyoming	41	41	41	44	38	47
U.S.	**29**	**31**	**27**	**38**	**30**	**40**

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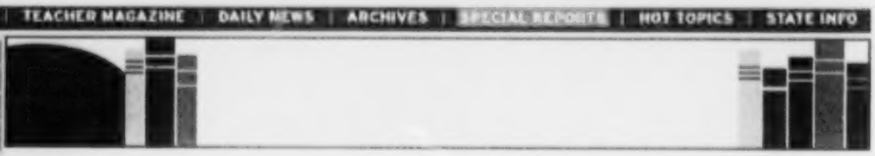

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Note: N/A Data not available.

Use of Technology					
	Percent of schools where at least 50% of teachers use a computer daily for planning and/or teaching (2000)				
	Statewide	High-poverty schools	Low-poverty schools	High-minority-enrollment schools	Low-minority-enrollment schools
Alabama	69	62	69	62	72
Alaska	92	75	93	80	96
Arizona	68	N/A	N/A	67	67
Arkansas	71	71	71	67	72
California	66	60	73	63	72
Colorado	89	73	91	79	91
Connecticut	72	50	72	25	74
Delaware	72	67	79	100	74
District of Columbia	50	33	67	N/A	N/A
Florida	80	77	81	73	83
Georgia	84	85	88	87	87
Hawaii	79	75	80	N/A	N/A
Idaho	84	67	86	N/A	N/A
Illinois	70	N/A	N/A	61	73
Indiana	87	83	87	80	87
Iowa	91	**	91	N/A	N/A
Kansas	86	93	86	88	88
Kentucky	84	77	85	N/A	N/A
Louisiana	73	68	76	56	82
Maine	81	67	80	N/A	N/A
Maryland	63	47	66	50	68

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Massachusetts	78	N/A	N/A	67	81
Michigan	72	68	72	61	73
Minnesota	84	67	88	70	87
Mississippi	64	62	58	66	50
Missouri	77	77	75	62	77
Montana	75	N/A	N/A	N/A	N/A
Nebraska	75	N/A	N/A	N/A	N/A
Nevada	78	N/A	N/A	N/A	N/A
New Hampshire	54	N/A	N/A	N/A	N/A
New Jersey	68	72	68	62	71
New Mexico	74	N/A	N/A	74	78
New York	69	51	76	51	75
North Carolina	76	67	79	75	77
North Dakota	81	33	84	50	82
Ohio	83	80	82	71	83
Oklahoma	62	56	66	55	64
Oregon	85	75	88	N/A	N/A
Pennsylvania	69	N/A	N/A	71	67
Rhode Island	91	N/A	N/A	N/A	N/A
South Carolina	81	81	81	76	83
South Dakota	81	N/A	N/A	N/A	N/A
Tennessee	80	N/A	N/A	62	83
Texas	80	75	82	77	82
Utah	78	N/A	N/A	N/A	N/A
Vermont	82	N/A	N/A	N/A	N/A
Virginia	84	71	85	85	84
Washington	76	N/A	N/A	92	74
West Virginia	80	68	87	N/A	N/A
Wisconsin	75	64	75	75	75
Wyoming	76	N/A	N/A	N/A	N/A
U.S.	**76**	**69**	**79**	**69**	**78**

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THERE'S MORE THAN ONE DIGITAL DIVIDE

TECHNOLOGY COUNTS 2001

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Note: N/A Data not available.

Use of Technology

	Percent of schools where at least 50 percent of teachers use the Internet for instruction (2000)				
	Statewide	High-poverty schools	Low-poverty schools	High-minority-enrollment schools	Low-minority-enrollment schools
Alabama	58	34	50	35	49
Alaska	85	83	77	83	75
Arizona	54	N/A	N/A	36	43
Arkansas	55	37	50	27	51
California	55	35	45	35	47
Colorado	64	48	57	50	57
Connecticut	51	27	42	22	43
Delaware	60	50	62	71	57
District of Columbia	32	25	13	19	100
Florida	47	34	40	34	39
Georgia	53	39	53	41	49
Hawaii	63	67	59	56	100
Idaho	73	67	67	N/A	68
Illinois	66	N/A	N/A	28	59
Indiana	53	40	46	36	46
Iowa	73	41	66	33	65
Kansas	68	43	64	38	62
Kentucky	71	59	66	0	62
Louisiana	60	44	48	38	51
Maine	70	63	66	100	66
Maryland	55	27	43	36	43
Massachusetts	59	N/A	N/A	42	48

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Michigan	56	38	45	36	45
Minnesota	70	38	65	32	66
Mississippi	65	47	48	44	51
Missouri	71	45	63	26	64
Montana	68	47	65	40	64
Nebraska	80	73	76	63	76
Nevada	54	38	37	29	41
New Hampshire	57	N/A	N/A	N/A	50
New Jersey	64	40	55	39	59
New Mexico	57	N/A	N/A	38	45
New York	53	28	46	26	47
North Carolina	59	46	52	44	54
North Dakota	85	60	80	33	81
Ohio	70	39	57	30	58
Oklahoma	58	40	44	34	44
Oregon	63	48	53	0	53
Pennsylvania	54	N/A	N/A	28	43
Rhode Island	73	50	56	40	56
South Carolina	70	58	65	54	68
South Dakota	79	63	70	67	70
Tennessee	71	N/A	N/A	52	66
Texas	65	43	59	45	61
Utah	65	42	62	29	62
Vermont	73	67	70	N/A	67
Virginia	75	44	67	49	68
Washington	58	N/A	N/A	43	49
West Virginia	71	63	71	100	68
Wisconsin	64	33	60	34	60
Wyoming	66	N/A	N/A	N/A	59
U.S.	**63**	**42**	**55**	**39**	**56**

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Note: N/A Data not available.

Use of Technology					
	Percent of schools where at least 50 percent of teachers have school-based e-mail addresses (2000)				
	Statewide	High-poverty schools	Low-poverty schools	High-minority-enrollment schools	Low-minority-enrollment schools
Alabama	58	44	64	52	60
Alaska	94	100	93	100	92
Arizona	76	N/A	N/A	80	73
Arkansas	79	73	84	75	84
California	65	59	71	57	74
Colorado	85	73	89	75	90
Connecticut	40	N/A	N/A	100	33
Delaware	98	100	97	100	96
District of Columbia	20	N/A	N/A	N/A	N/A
Florida	66	64	71	63	71
Georgia	75	65	83	66	80
Hawaii	90	80	93	N/A	N/A
Idaho	92	100	92	N/A	N/A
Illinois	72	N/A	N/A	47	81
Indiana	85	67	89	57	88
Iowa	94	75	95	N/A	N/A
Kansas	85	93	85	100	85
Kentucky	87	76	93	N/A	N/A
Louisiana	54	56	48	50	55
Maine	94	67	95	N/A	N/A
Maryland	58	50	64	45	67
Massachusetts	69	N/A	N/A	59	74
Michigan	75	62	77	45	78
Minnesota	92	90	94	73	95
Mississippi	54	50	54	46	60
Missouri	81	76	80	55	82
Montana	72	N/A	N/A	50	72
Nebraska	100	100	100	100	100
Nevada	74	50	74	67	73
New Hampshire	73	N/A	N/A	N/A	N/A

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New Jersey	76	74	77	71	79
New Mexico	78	N/A	N/A	74	82
New York	55	27	65	22	67
North Carolina	77	79	78	77	77
North Dakota	89	67	91	50	91
Ohio	87	65	89	64	88
Oklahoma	64	61	64	58	63
Oregon	85	100	81	N/A	N/A
Pennsylvania	66	N/A	N/A	67	67
Rhode Island	78	33	85	50	81
South Carolina	81	88	83	79	87
South Dakota	86	N/A	N/A	N/A	N/A
Tennessee	82	N/A	N/A	46	87
Texas	81	72	85	72	88
Utah	96	100	95	100	95
Vermont	82	50	88	N/A	N/A
Virginia	86	86	86	85	87
Washington	89	N/A	N/A	100	87
West Virginia	78	72	85	N/A	N/A
Wisconsin	85	75	85	75	85
Wyoming	90	N/A	N/A	N/A	N/A
U.S.	**77**	**66**	**81**	**64**	**81**

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STATE PROFILES

May 10, 2001

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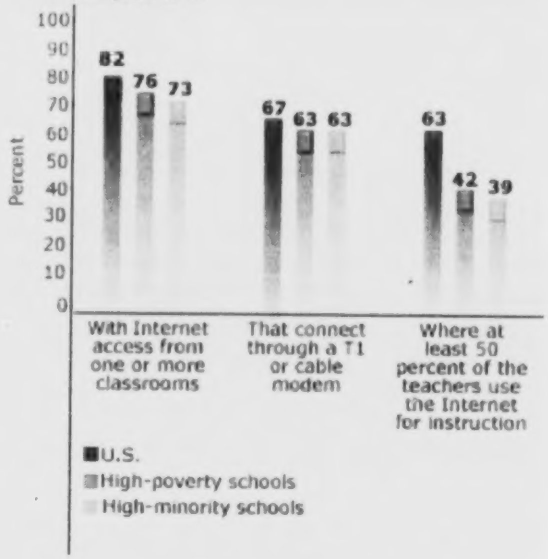
Notes on State Profiles

Pre-K-12 Enrollment (2000-01): U.S. Department of Education, National Center for Education Statistics, "Early Estimates of Public Elementary and Secondary Education Statistics: School Year 2000- 2001," February 2001. The figure includes students enrolled at a school or local education agency on the school day closest to October 1, 2000. Membership includes all students in prekindergarten through grade 12 and ungraded classes.

United States

Of those public schools with Internet access, the percent...



SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

Percent of Children in Poverty (1998): National Center for Children in Poverty, "Child Poverty in the States: Levels and Trends from 1979 to 1998," August 2000. The figure includes all children under the age of 18 in poverty. In 1998, the official poverty threshold for a family of four was $16,660.

Percent of Minority Students (1999-00): U.S. Department of Education, National Center for Education Statistics, "Public School Student, Staff, Graduate Counts by State, School Year 1999-2000" January 2001. The figure includes all students not classified as "White, Non-Hispanic" in the report.

Students per Instructional Computer (1999-00): Market Data Retrieval, "Technology in Education 2000". "Instructional computer" refers to any computer used for student instruction.

E-rate Funding (2001): Unpublished tabulations from the Schools and Libraries Division of the Universal Service Administration Company. The federal E-rate program provides discounts on telecommunications services, Internet access, and internal connections, with priority given to schools and libraries that serve poorer students or are located in rural areas. Since the beginning of the program in January 1998, a total of over $5.7 billion has been awarded. The dollar figure for each state is the total funding awarded to schools and libraries through March 6, 2001. Updates on how much each state has been awarded are posted at: www.sl.universalservice.org.

Note: Many figures in the state narratives in this section are state-reported. Consequently, on similar indicators such as student- to-computer ratios, those numbers may differ from figures cited elsewhere in the report.

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STATE DATA TABLES

May 10, 2001

Sources and Notes For State Data Tables

Definitions:

Statewide refers to a representative sample of schools throughout the state.

High-poverty schools refers to schools in which more than 50 percent of students are eligible for the federal program that provides free or reduced-price school lunches.

Low-poverty schools refers to schools in which 50 percent or fewer of students are eligible for the federal program that provides free or reduced-price school lunches.

High-minority-enrollment schools refers to schools in which more than 50 percent of students belong to racial or ethnic minority groups.

Low-minority-enrollment schools refers to schools in which 50 percent or fewer of students belong to racial or ethnic minority groups.

Poor/nonpoor refers to students who are eligible for the federal program that provides free or reduced-price school lunches.

Sources and Notes:

Students per instructional computer: Market Data Retrieval, "Technology in Education 2000," and unpublished tabulations from MDR's 1999-2000 Public School Technology Survey. This figure includes all computers that are available for student instruction.

Students per instructional computer located in classrooms, computer labs, library/media centers: MDR.

Percent of instructional computers that are 286, 386, or Apple IIs; 486 or non-Power Macs; 586, Pentium II, or Power Macs: MDR.

Students per instructional multimedia computer: MDR. A multimedia computer has a sound card and a CD- ROM drive, components that enable it to make use of sophisticated educational software. This figure includes only multimedia computers that are available for student instruction.

Students per Internet-connected computer: MDR. "Internet-connected computer" refers to a computer, including noninstructional computers, that can access the Internet.

Percent of schools with Internet access: MDR.

Percent of schools with Internet access from one or more classrooms: MDR.

Among schools with at least one classroom connected to the Internet, the percent of classrooms with Internet access: MDR.

Of those schools with Internet access, the percent that connect through a T1 line or cable modem: MDR.

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Percent of schools that make computers available to students, parents, or community members after school hours: MDR

State regularly conducts data collection on technology in schools: *Education Week* survey of state departments of education, 2001. States receiving a check in this column periodically collect data from districts and/or schools on technology-related issues that may include, for example, student-to-computer ratios, Internet connections, use of technology by both students and teachers, and technology professional development for educators.

Requirements for initial teacher licensure include technology training: *Education Week* . States receiving a check in this column either require teacher-preparation programs to include technology, or include technology in the standards for initial teacher licensure.

Requirements for initial teacher licensure include passing a technology test: *Education Week* . States receiving a check in this column require candidates for an initial teaching license to pass a state- approved assessment of technological skills.

State requires technology training as part of teacher-recertification requirements: *Education Week* .

State has time requirements for technology-related professional development for all teachers: *Education Week* . States receiving a check in this column require that schools or districts set aside time for technology-related professional development.

State offers professional or financial incentives to teachers and administrators to use technology: *Education Week* , U.S. Department of Education, National Center for Education Statistics, National Assessment of Educational Progress (NAEP) 1998 National and State Reading Summary Data Tables for Grade 4 Teacher Data. Teachers were asked: "Through training received in college or university courses or professional- development workshops, how prepared are you to implement the following curricular approaches or instructional techniques?" Because students are the unit of analysis for NAEP, teacher responses to the survey are presented in terms of the percent of students in each category who participated in NAEP. Students were not the respondents for this question.

Percent of 8th graders whose language arts teachers report feeling at least "moderately prepared" to use computers, to make use of computer software for teaching reading, and to make use of computer software for teaching writing: U.S. Department of Education, National Center for Education Statistics, NAEP 1998 National and State Reading Summary Data Tables for Grade 8 Teacher Data. Teachers were asked: "Through training received in college or university courses or professional-development workshops, how prepared are you to implement the following curricular approaches or instructional techniques?" Because students are the unit of analysis for NAEP, teacher responses to the survey are presented in terms of the percent of students in each category who participated in NAEP. Students were not the respondents for this question.

State standards for students include technology: *Education Week* survey of state departments of education, 2001.

State tests students on technology standards: *Education Week* . States receiving a check in this column either use a test specifically related to state technology standards, or have technology integrated into state academic standards as well as the state assessments based on those standards.

Percent of 4th graders whose language arts teachers report using computer software for reading instruction at least once or twice a week: U.S. Department of Education, National Center for Education Statistics, NAEP 1998 National and State Reading Summary Data Tables for Grade 4 Teacher Data. Teachers were asked: "How often do you use the following resources to teach reading in this class?" Because students are the unit of analysis for NAEP, teacher responses to the survey are presented in terms of the percent of students in each category who participated in NAEP. Students were not the respondents for this question.

Percent of 8th graders whose language arts teachers report using computer software for reading instruction at least once or twice a week: U.S. Department of Education, National Center for Education Statistics, NAEP 1998 National and State Reading Summary Data Tables for Grade 8 Teacher Data. Teachers were asked: "How often do you use the following resources to teach reading in this class?" Because students are the unit of analysis for NAEP, teacher responses to the survey are presented in terms of the percent of students in each category who participated in NAEP. Students were not the respondents for this question.

Percent of 4th graders who use a computer for schoolwork at least once or twice a week: U.S. Department of Education, National Center for Education Statistics, NAEP 1998 National and State Reading Summary Data Tables for Grade 4 Student Data. Students were asked: "How often do you use a computer for schoolwork?"

Percent of 8th graders who use a computer for schoolwork at least once or twice a week: U.S. Department of Education, National Center for Education Statistics, NAEP 1998 National and State Reading Summary Data Tables for Grade 8 Student Data. Students were asked: "How often do you use a computer for schoolwork?"

Percent of schools where at least 50 percent of teachers use a computer daily for planning and/or teaching: Market Data Retrieval, "Technology in Education 2000," and unpublished tabulations from MDR's 1999-2000 Public School Technology Survey. School principals or other school-level officials were asked: "What percent of your teachers use a computer on a daily basis for instructional planning and/or teaching?"

Percent of schools where at least 50 percent of teachers use the Internet for instruction: MDR. School principals or other school-level officials were asked: "What percent of your teachers use the Internet for instructional purposes?"

Percent of schools where at least 50 percent of teachers have school-based e-mail addresses: MDR.

- **How Market Data Retrieval's survey was conducted:**

From October 1999 to March 2000, all of the approximately 87,700 public schools in the United States received MDR's Public School Technology Survey by mail, phone, or the Internet. Approximately 30,200 schools completed the survey, yielding a response rate of 34 percent. Of those schools that responded, a majority (88 percent) responded to the phone survey.

It should be noted that the survey results that related to teachers' technology use, skill level, and school-based e-mail addresses; and computer availability after school hours came from a randomly selected subset of 7,500 schools that produced a median response rate of 64 percent.

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Across the Nation

By Jessica L. Sandham

From the prairie lands of the east to the black hills of the west, technology is the great equalizer among schools in South Dakota. Thanks to a multiyear initiative to use technology to help surmount the challenges often faced by the state's small, rural schools, Advanced Placement courses were offered for the first time this spring--via the Internet--in 26 districts. An astonishing 110,000 Internet connections are available to a school population of only 130,000 students. And each summer, teachers throughout the state are invited to attend an intensive, monthlong program designed to help them integrate the state's new high-tech tools into their lesson plans.

Many of South Dakota's efforts to wire schools, establish online programming, and train teachers are similar to approaches that various other states have taken as they try to narrow the digital divide that separates the haves from the have-nots in educational technology. Still, when viewed collectively, state-by-state approaches to equalizing access to technological resources--and the results gained from those efforts--are far from uniform.

"We've made a lot of strides nationally in narrowing that gap," says Norris E. Dickard, a senior associate at the Washington-based Benton Foundation, which tracks issues of equity in access to technology.

But, he adds, "the bottom line is that states are all over the board."

States such as Delaware, Maine, Mississippi, and South Dakota have all made big commitments to the universal deployment of educational technology, says Keith Krueger, the executive director of the Consortium for School Networking, based in Washington.

"It's almost an inverse logic," Krueger says. "Data show that some of

Related Education Week stories:

"Cyber Learning at Online High," Jan. 24, 2001.

"Plan To Give Laptops to Maine 7th Graders Faces Doubtful Future," March 15, 2000.

Charts

Technology
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Connections

the rural states are leaders in connectivity, and some of the bigger states are surprising in their absence" of Internet connections in schools.

According to Mississippi officials, for example, all of the state's schools are now linked to the Internet and to one another through a statewide network that also connects them to state agencies, community colleges, and universities. The final school to be linked to the network was hooked up in December of last year.

"Rural states recognize how important [connecting to the Internet] is," says Helen Soulé, the director of technology support and training in the Mississippi Department of Education. "It can be a lifeline for a community."

States Vary on Access and Content

Of course, setting up the necessary infrastructure is only a part of the equation that enables students to have equitable in-school access to technology. Ensuring that schools have affordable access to telecommunications services, including the Internet, is another.

To that end, the states have played a more aggressive role in coordinating the federal E-rate program, says Arthur D. Sheekey, the coordinator of learning technologies for the Council of Chief State School Officers in Washington.

"I've seen a direct correlation," Sheekey says. "The states that have assumed a leadership role seem to have a higher participation in the E-rate program."

In Mississippi, Soulé says, state efforts to negotiate uniform rates for all districts through the state's primary telecommunications provider, BellSouth, has meant that rural districts are paying less than $500 a month for T1 lines that would otherwise likely cost between $1,200 and $2,000 a month. Such lines allow for faster Internet service than telephone connections. "A T1 in Jackson and a T1 in Coffeeville cost the same amount," Soulé says. "So school districts are not punished for being farther away from the larger cities."

Development of computer-delivered academics has dovetailed with the trend toward high-stakes testing.

As states report increasingly smaller student-to-computer ratios, many are also turning their attention to creating or offering computer-delivered academic programs or materials. Perhaps not coincidentally, says Sheekey, that development has dovetailed with the trend in states toward more high-stakes testing of students.

"You really have to extend that learning beyond school, because there often isn't enough time during school hours," he says. "It begins to raise implications for states' seeing to it that the learning goes beyond the schools."

In Florida, for example, the state has spent more than $16 million over the past three years to develop the Florida Online High School, an accredited diploma-granting institution that offers 56 courses. Roughly 5,000 students--including some who are being schooled at home--are now taking at least one class through the high school; many come from rural areas and wouldn't otherwise have access to Advanced Placement or other specialized courses the school provides online. "One of their major motivations for doing this was equity in access," says William R. Thomas, the director of educational technology for the Atlanta-based Southern Regional Education Board.

Thomas says he knows of very few states that aren't working to provide students and schools with some form of computer-based academic programming, but that none has made a commitment on the scale of Florida's.

"There's Florida, and then there are 49 states," Thomas says. Still, he notes, "the vast majority of states are in the process of addressing digital-divide issues, and this is one way they're going about it."

In Search of After-School Equity

As states strive to make online, anytime learning opportunities available to more students, many states have also had to consider that the digital divide they have worked to close during school hours is suddenly thrown open again when students go home.

'The big divide comes when [students] walk out school doors.'

According to a survey conducted in 1997 by the U.S. Department of Education, 80 percent of high school students from families with annual household incomes of at least $75,000 reported using a computer at home. For students from families with annual household incomes in the $10,000-to-$15,000 range, only 18 percent of students reported using a computer at home.

Ultimately, "we have almost bridged the digital divide in schools in terms of buildings and classrooms connected to the Internet," says Dickard of the Benton Foundation. "The big divide comes when [students] walk out school doors."

To that end, states are adopting a variety of approaches to try to give students more equal access to computers in the after- school hours. Lawmakers in Maine, for example, were considering this spring a proposal by Gov. Angus S. King Jr. to provide school-owned laptop computers to all 7th and 8th graders in the state. Other states, including Florida, Illinois, and Virginia, have committed resources to the development of after-school community computer labs that students can use if they don't have computers at home.

The Illinois board of education, for example, has partnered with PowerUP--a McLean, Va.-based organization devoted to bridging the digital divide--and a consortium of high-poverty school districts just south of Chicago to establish after-school computing centers in 45 schools. The state committed $1 million to the program this fiscal year.

"If we're going to resolve this achievement gap between students of color and white students, and high-poverty and low-poverty students, we have to give them access to the same educational opportunities," says Lugene Finley Jr., the chief technology officer for the Illinois state board. "And technology does that. It can be an equalizer when you provide the tools."

Michigan legislators, meanwhile, have made teachers the focus of some of their efforts to bridge the digital divide, committing $110 million last year to furnish each of the state's roughly 90,000 full-time teachers with his or her own laptop or desktop computer. School districts themselves will either lease or own the computers and provide them to teachers as long-term loans.

Teachers and districts have to go through a basic application process to qualify for the program. The 176,000-student Detroit school system, for example, recently applied for--and will likely receive--computers for more than 6,000 of its teachers.

"The educators we've spoken to were at first in disbelief," says Jamey T. Fitzpatrick, the vice president of development and education policy for the Michigan Virtual University, a nonprofit organization coordinating the computer-distribution program for the state. "For a number of them, this is giving them an opportunity to have something they wouldn't otherwise have access to."

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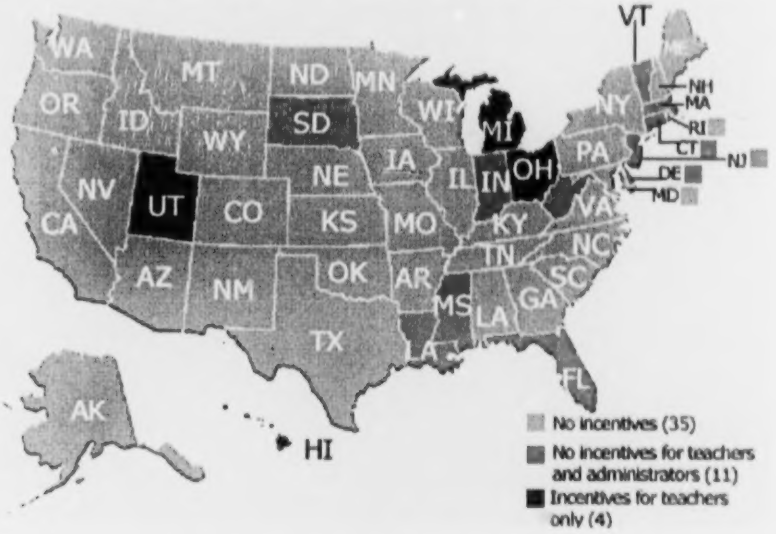
Technology Incentives

To encourage the use of technology in schools, some states now provide financial or professional incentives for such use by teachers and administrators.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HI
No incentives (35)
No incentives for teachers and administrators (11)
Incentives for teachers only (4)

SOURCE: Education Week survey of state departments of education, 2001

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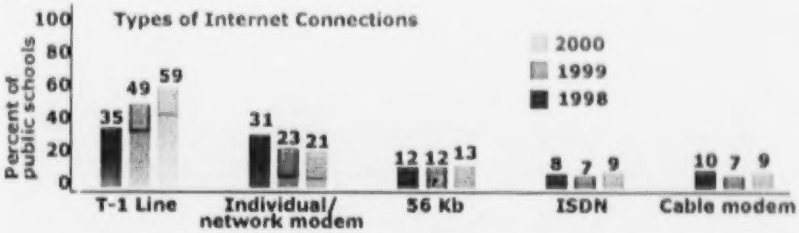
Faster Connections

The number of schools with high-speed T1 line connections to the Internet has grown steadily from 1998-2000.



NOTES: Survey respondents could choose multiple answers, so percentages may not add up to 100. T1 lines and cable modems provide the fastest connections of those shown. These two types, along with the slower 56Kb lines use "dedicated" connections that remain fixed between two points. ISDN and individual/network modem connections are relatively slow and rely on dial-up devices.

SOURCE: Market Data Retrieval, "Technology in Education 2000"

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Alabama

Alabama's governor announced an ambitious plan last fall to help close the state's digital divide, promising to provide high-speed Internet access to all schools by 2003.

But that proposal, which would have been paid for with a blend of state and federal money, has run into some difficulties, including a state budget crunch resulting from the slowing economy. So for now, the Internet plan has been put on hold.

That wasn't the first time Gov. Donald Siegelman sought to increase spending on educational technology. A year earlier, the first-term Democrat proposed the creation of a statewide lottery, with one-third of the annual proceeds, an estimated $50 million, to be reserved for school technology. But Alabama voters said no to the lottery.

Even school technology money in the current state budget is in question. The legislature more than doubled technology funding, from $3.5 million to $8.5 million, this year. But with the fiscal crisis—caused by a drop in state sales-tax and income-tax revenue—districts face midyear budget cuts and may spend a portion of that technology aid to meet other pressing needs.

The $8.5 million in funding for educational technology does not specifically target the digital divide. The money is spread evenly throughout Alabama schools. Lawmakers set aside $181 per teacher; schools can choose to combine those allotments or allow individual teachers to spend the money as they choose.

VITAL STATISTICS

State Education Agency Web Site: www.alsde.edu

State Education Agency Technology Contact:
Melinda Maddox
(334) 242-9594
mmaddox@alsde.edu

Pre-K-12 Enrollment: 726,000

Percent Children in Poverty: 24.1

Percent Minority Students: 38.9

Student per Instructional Computer: 5.0

E-Rate Funding (through March 6, 2001): $91,314,462

(See "Notes on State Profiles.")

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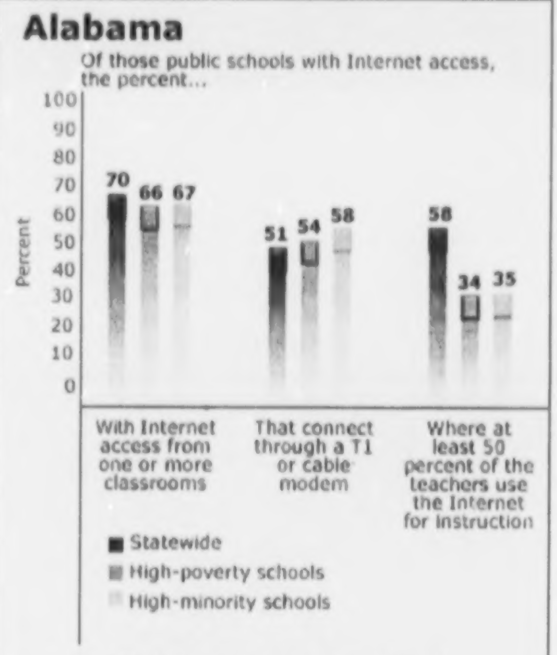

SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

Rita F. Wright, the technology director for the Calhoun County schools, contends that, despite the big increase in technology funding, it still is not nearly enough.

Wright, who also is the president of the Alabama Educational Technology Association, says that $181 per teacher "is almost useless. It just doesn't go very far."

At the same time, the state does have several relatively new initiatives to help schools meet their technology needs.

The Alabama Virtual Library, first funded in fiscal 2000 at $3 million and again at the same level this budget year, provides all public schools and libraries in the state that are Internet-connected with free access to a variety of resources, including electronic encyclopedias, dictionaries, atlases, almanacs, and full-text periodicals.

Another initiative, spearheaded by the governor, is called Technology in Motion. Financed at $1.6 million this year and last, it provides trainers who travel around the state to help teachers learn to use technology more effectively in the classroom. The state also sponsors an annual educational technology conference. About 4,000 teachers attend the conference each year, which provides a variety of professional-development opportunities.

And the state has launched the Alabama Online High School, a venture developed jointly with the University of Alabama in Tuscaloosa, foundations, and some federal assistance. The pilot program this year serves 218 students in 18 schools. Next year, the number of courses is expected to double, from 12 to 24.

—Erik Robelen

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Alaska

Despite its enormous size and many remote schools, Alaska offers almost all its schoolchildren Internet access. The challenge now is to put technology to better use in classrooms.

The state boasts an endowment, the Alaska Science and Technology Foundation, that offers $10,000 grants to every school for wiring, and will continue to do so through 2005.

That money has helped virtually every school tap the Internet, and satellite access is being explored for truly remote districts not yet online, says Michele DeShaw, the program manager for technology and innovation for the Alaska Department of Education and Early Development.

"We don't have an access divide to speak of," says DeShaw, who notes that the state leads the nation in Internet use among all age groups, including people younger than 18.

Alaska pays for hardware and software through general school money provided by the state, DeShaw says. Education technology isn't a separate program in the state budget, and school districts have the leeway to pay for technology as they see fit.

VITAL STATISTICS

State Education Agency Web Site:
www.educ.state.ak.us/

State Education Agency Technology Contact:
Michele DeShaw
(907) 465-8703
michele_deshaw@eed.state.ak.us

Pre-K-12 Enrollment: 136,000

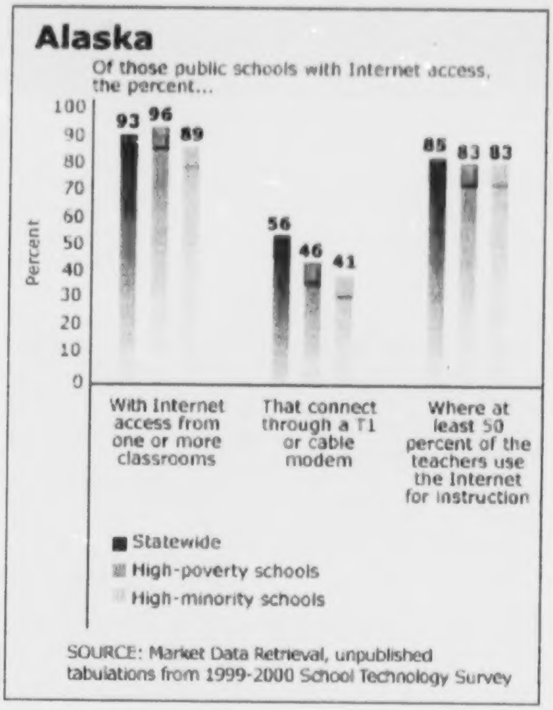
Percent Children in Poverty: 10.1

Percent Minority Students: 37.8

Student per Instructional Computer: 3.7

E-Rate Funding (through March 6, 2001): $37,148,779

(See "Notes on State Profiles.")



SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

Federal grants pay for training for teachers and students. The focus of training has shifted from learning how computers work to learning how computers can help with instruction.

Schools in poor and remote villages, serving predominantly Native Alaskans, still have their struggles in providing training and equipment in schools. High turnover is a factor in teacher training; many districts see new crops of teachers every year, DeShaw points out.

Carol Goltz, who oversees technology in Anchorage's secondary schools, says the 50,000-student district, the state's largest, had planned to provide one computer for every five students, with waves of replacement machines ensuring that no computer would be more than 5 years old.

But budget cuts intervened, she says, putting the program on hold.

Still, training in the Anchorage schools is constant, Goltz says. Full-time technology coordinators work in every high school, and part-time coordinators help in schools with younger children. The district needs more of those employees to work with teachers and to fix simple problems, especially in larger schools, Goltz says.

Students' have been drafted into service and into learning about technology. The ASSIST program—Advanced Students Supporting Instructing and Servicing Technology—provides substantial training for students interested in computers. They can work with teachers and classmates to answer questions and solve simple problems.

To address the digital divide, the Anchorage schools funnel federal Title I dollars toward reading and writing instruction, linking work on those skills with technology, Goltz says.

Students attending alternative schools—including those enrolled in a program for homeless youths and in a storefront school for students who need to catch up on their work—learn to design Web pages and acquire other skills that could help them land jobs.

—Alan Richard

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Arizona

Providing all K-12 students with equal access to modern technology is not a matter of choice for the state of Arizona.

In the late 1980s, a coalition of poor districts filed a lawsuit against the state, arguing that Arizona's system of paying for school construction and building maintenance violated a state constitutional requirement for a "general and uniform" public school system. The Arizona Supreme Court agreed in 1994, and the capital costs of elementary and secondary education--including technology infrastructure--shifted from localities to the state.

Deciding what schools need in computers and Internet access falls to the gubernatorially appointed School Facilities Board. The panel has drawn up broad plans for linking every school and classroom in the state to one another and the Internet, and it will buy the equipment necessary to make those plans a reality.

"Arizona is so far behind on every other educational issue, but on this technology issue, we're way out in front," says John H. Wright, the vice president of the Arizona Education Association and a member of the facilities board.

VITAL STATISTICS

State Education Agency Web Site:
www.ade.state.az.us/

State Education Agency Technology Contact:
Patricia Likens
(602) 542-5072
plikens@mail1.ade.state.az.us

Pre-K-12 Enrollment:857,000

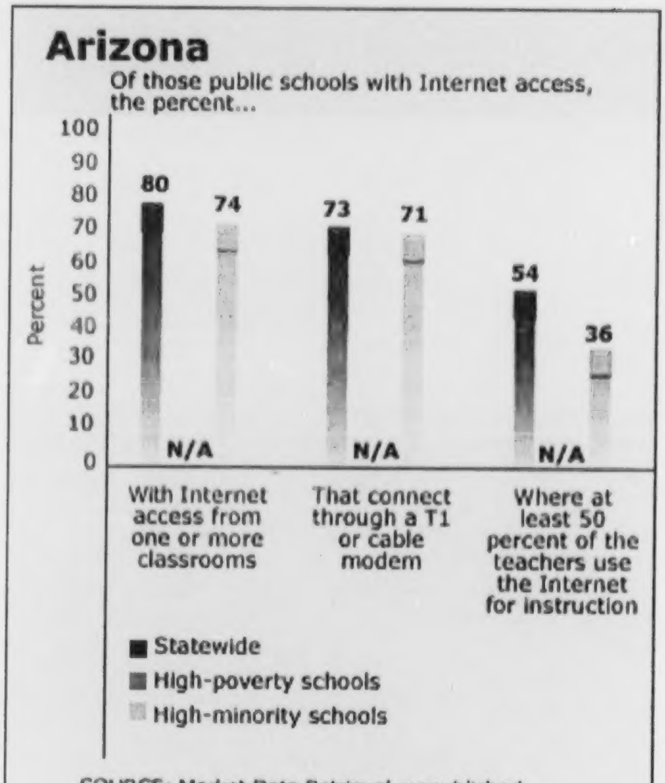
Percent Children in Poverty:26.1

Percent Minority Students:46

Student per Instructional Computer:4.8

E-Rate Funding (through March 6, 2001):$118,609,022

(See "Notes on State Profiles.")



SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

The board recently announced it would buy more than 50,000 computers for Arizona school districts over the next five months. Its director, Philip E. Geiger, says a primary goal is achieving a ratio of one computer for every eight students by the end of next school year, a figure based on state estimates of need. The hardware alone is expected to cost the state more than $50 million. For every computer purchase, $60 will be set aside for training teachers to put the technology to good use in the classroom.

Once the computers are in place, the facilities board will provide networking and Internet connections "for all instructional areas" at a cost expected to exceed $100 million.

As state officials describe it, teachers will be able to use the Internet for instruction and distance learning, and students and educators will be able to download educational software over the network. Districts will also have the option of storing academic portfolios for students' entire educational careers, and the records could be transferred from one school or district to the next.

By June 2003, every public school is scheduled to have 100-megabit broadband access, enabling educators and students to do such things as view video on the Internet and take courses online.

"The court required we provide equitable distribution of technology funding, and the School Facilities Board decided this is essential," Geiger says of the plans.

The board has crafted a model for outfitting all schools with the new technology. Schools deemed to have greater need will receive more aid from the state, but even many wealthier districts will need help meeting the standards set by the board, Geiger says.

--Darcia Harris Bowman

Ne:

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Arkansas

In the Arkansas Delta, parents often have more basic worries than whether their children are using computers.

"How do you get parents to value technology, when they are worried about getting food on the table?" says Suzanne McCommon, the director of an education-service cooperative in eastern Arkansas that is independent from the state education department and provides support for schools in a five-county area.

Such are the challenges education leaders face in some schools in the Arkansas Delta, a stretch of land that borders the Mississippi river and is among the nation's most impoverished regions--where homes may not have a telephone, never mind a computer. Children and families often are far removed from an Information Age world where technology--from e-mail to cell phones to Internet sites--seems ever present.

Because schools in the Delta often are at the center of community life, McCommon believes they have an added responsibility to make sure students have access to the technology they likely will not be exposed to at home.

But like many poor areas with paltry tax bases, raising money for schools can be extremely difficult, and districts have to be creative in stretching limited financial resources. One way that Delta-area school districts have accomplished that, McCommon says, is to use "compressed video," a technology that allows teachers in some schools to transmit and receive classroom lessons throughout the state via live video.

VITAL STATISTICS

State Education Agency Web Site: arkedu.state.ar.us/

State Education Agency Technology Contact:
James Boardman
(501) 682-1077
jboardman@arkedu.k12.ar.us

Pre-K-12 Enrollment:448,000

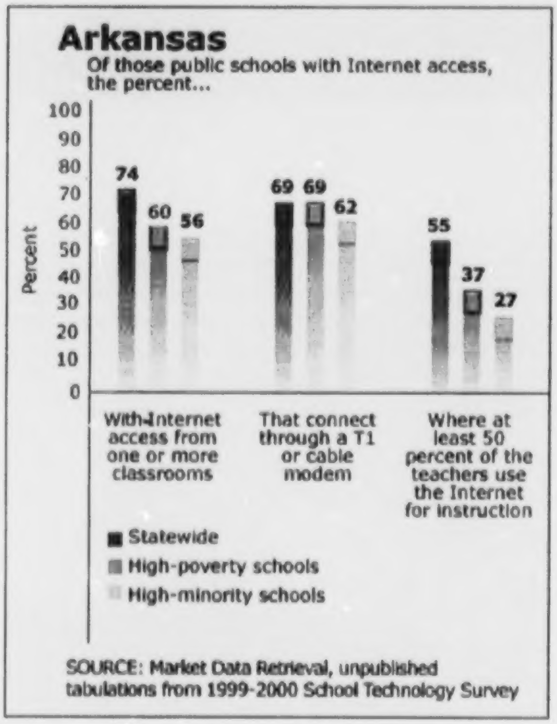
Percent Children in Poverty:16.3

Percent Minority Students:27.8

Student per Instructional Computer:5.1

E-Rate Funding (through March 6, 2001):$40,786,550

(See "Notes on State Profiles.")



Arkansas

Of those public schools with Internet access, the percent...

SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

One program the state brags about that has been adopted in several states around the country is Environmental and Spatial Technology, or EAST. The program, which was created by Arkansas businessman Tim Stephenson six years ago, has spread to 150 schools in 8 states.

EAST has partnerships with more than 30 businesses that provide schools with a broad array of technology. Students use database design, geographic-information systems, and other tools to work with community programs, such as providing technology workshops for senior citizens.

Stephenson, the director of the EAST program, was particularly concerned with expanding the program to poor schools after discovering that 60 public high schools in the 15-county Delta region lacked such a program.

The Arkansas Department of Education, acting on Stephenson's recommendation to remedy that disparity, will provide $1.4 million to increase the number of schools in the Delta that use EAST. That money, along with an additional $10 million from the business community, will help launch the program in 27 of those schools.

But Stephenson argues that is only the beginning in making sure students are not left behind. "Addressing the digital divide in terms of access is a simplification of a very complex problem," he says. "Most people have taken laminated lesson plans from the 1960s, put them on a Web page, and called it e-learning."

Jim Boardman, the director of information and technology for the state education department, says that integrating technology into all aspects of the school culture--not just one course--must be a priority if all students are to get the chance to work with sophisticated technology.

Teachers in Arkansas receive at least six hours of technology training each year. "You really need your teachers interested in using technology," Boardman says. "You need a critical mass of teachers in a school who want to do this."

--John Gehring

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California

California has begun to tackle its digital divide, focusing primarily on high schools. But state officials say much work remains in helping other grade levels.

For fiscal 2001, the current budget year, the state legislature gave about $458 million to educational technology. Of that, a one-time allocation of $175 million went to high schools so they could either offer students increased access to online Advanced Placement courses or bring their student-to-computer ratios down to 4.75-to-1.

VITAL STATISTICS

State Education Agency Web Site:
www.cde.ca.gov

State Education Agency Technology Contact:
Nancy Sullivan
(916) 323-5715
nsulliva@cde.ca.gov

Pre-K-12 Enrollment:6.2 million

Percent Children in Poverty:23.3

Percent Minority Students:63

Student per Instructional Computer:7.2

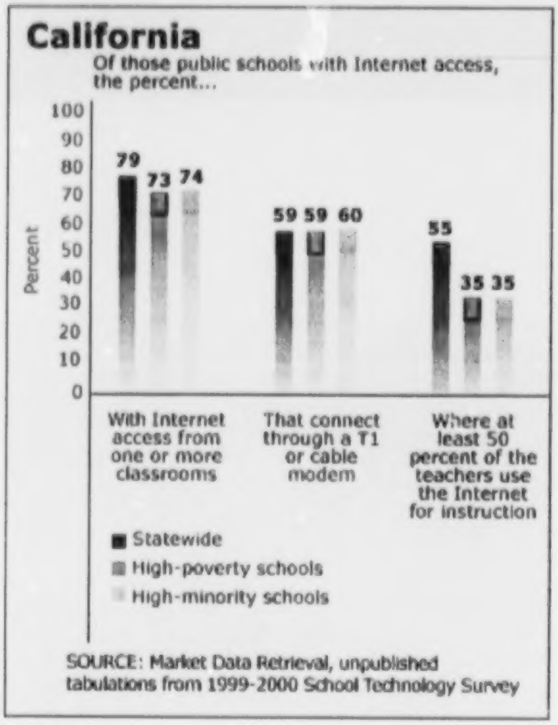
E-Rate Funding (through March 6, 2001):$914,562,876

(See "Notes on State Profiles.")

Most of the money went toward decreasing ratios, with "schools on the wrong side of the divide" getting greater sums, says Nancy Sullivan, the manager of California's educational technology office.

The initiative comes in a state where access to multimedia computers runs anywhere from six to 12 students per multimedia computer, according to a state survey conducted last year comparing 11 regions.

Where districts stand, Sullivan says, largely depends on wealth. A state analysis of school technology has shown that access is closely linked to the percentage of students who qualify for free or reduced-price lunches. "As that percentage increases," Sullivan says, "access to technology decreases."



SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

Another chunk of California's educational technology allocation went to high schools in fiscal 2001. The legislature gave a final $175 million to complete the Digital High School Program, a four-year, $500 million commitment to improve connections to the Internet and teacher training. The money is awarded--on a per-pupil basis--to high schools that apply for funding.

So far, though, grades K-8 receive no state money to address the digital divide. "The federal Technology Literacy Challenge Fund grant money is the only money earmarked right now for below high school," Sullivan says.

One technology program does target the pre-high-school grade group--a teacher-training initiative that received $12 million in state funding for 2001. But to get a share of that money, districts must already have sufficient Internet access and up-to-date computers.

"One of the complaints is that that program's for the haves, and that the have-nots don't qualify, and that's an accurate criticism," Sullivan says. "The argument in favor of it is that we should be providing professional development for teachers who have the technology."

This year's funding also includes $32 million to begin building a statewide network that could link elementary and secondary schools to colleges and universities and provide them with high-speed Internet access. The state money is paying to build the network and provide access nodes in each county.

Individual districts, however, must come up with the money to connect to the network. "There is some concern over that right now," Sullivan says.

--Jo Anna Natale

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Colorado

Despite the fact that it provides no direct funding for educational technology, Colorado is still making efforts to close the digital divide.

The state education department helps districts with their applications for federal Technology Literacy Challenge Fund grants and the federal E-rate program.

"Since we don't have state funds, we're trying to leverage our federal funds to increase local capacity for connecting to the Internet," says Eric Feder, the director of educational telecommunications in the department. "In our TLCF grant process, we give positive points for rural applicants."

Owing largely to a tradition of local autonomy in education, Colorado has simply never gotten involved in paying for computers or other technology for schools. Districts are largely on their own to apply for federal aid or to dedicate local tax revenue for educational technology. So, just as Colorado shows disparities in education spending generally, there are wide differences in the availability of technology in schools throughout the state.

"Some districts are doing just great," Feder says. "In other schools, the students aren't so fortunate."

He says some districts in rural areas in the state's eastern plains have had unreliable Internet connections.

"In one district, the Internet service was out for 28 school days last year," he says. "That's a lot."

VITAL STATISTICS

State Education Agency Web Site: www.cde.state.co.us/

State Education Agency Technology Contact:
Eric Feder
(303)866-6859
Feder_e@cde.state.co.us

Pre-K-12 Enrollment:725,000

Percent Children in Poverty:13.4

Percent Minority Students:30.5

Student per Instructional Computer:4.6

E-Rate Funding (through March 6, 2001):$40,808,341

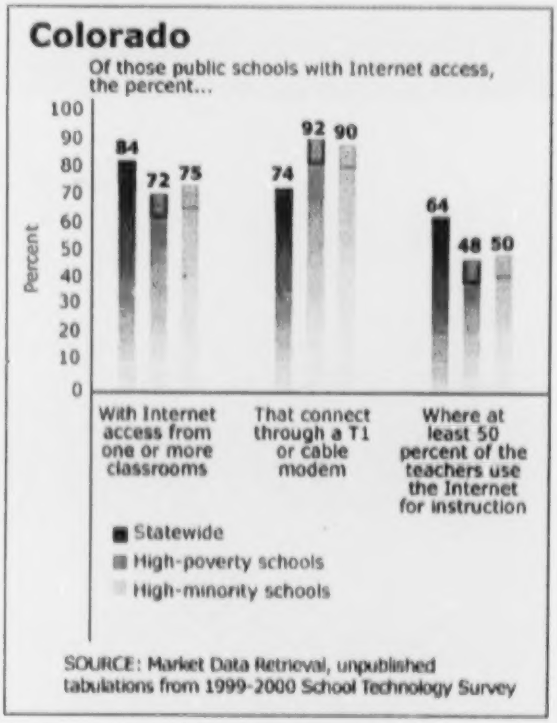
(See "Notes on State Profiles.")

Other districts, located in the Rocky Mountains, have difficulties caused by the terrain. They aren't connected by wires, and the mountains make wireless technology unreliable.

The state education department is working with the districts on grant applications that would bring satellite dishes to connect to the Internet, Feder says.

And all Colorado schools soon will be getting faster broadband connections. A high-speed state telecommunications network is being rolled out across Colorado, with "points of entry" in each county seat that can be accessed by schools, cities, and agencies.

"The schools will still have to get that last mile from their networks to the point of entry," Feder says. "But the state backbone is subsidized. There will be high-speed access where there isn't high-speed access now."



SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

The legislature is considering a measure that would facilitate funding for school technology, although most likely not with state money. Both houses have passed versions of a bill creating a "Colorado information-technology grant program" to which schools could apply for technology needs in grades 9-12.

Under the legislation, the education department would set up a grant fund to receive private contributions from foundations and corporations that would be redistributed to schools. The measure also would authorize state appropriations program, but there doesn't appear to be any momentum for budgeting state money right away.

--Mark Walsh

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Connecticut

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State Education Agency Web Site: www.state.ct.us/sde/

State Education Agency Technology Contact:
Germán Bermúdez
(860) 566-1971
german.bermudez@po.state.ct.us

Pre-K-12 Enrollment:562,000

Percent Children in Poverty:11.7

Percent Minority Students:29.5

Student per Instructional Computer:5.4

E-Rate Funding (through March 6, 2001):$80,000,614

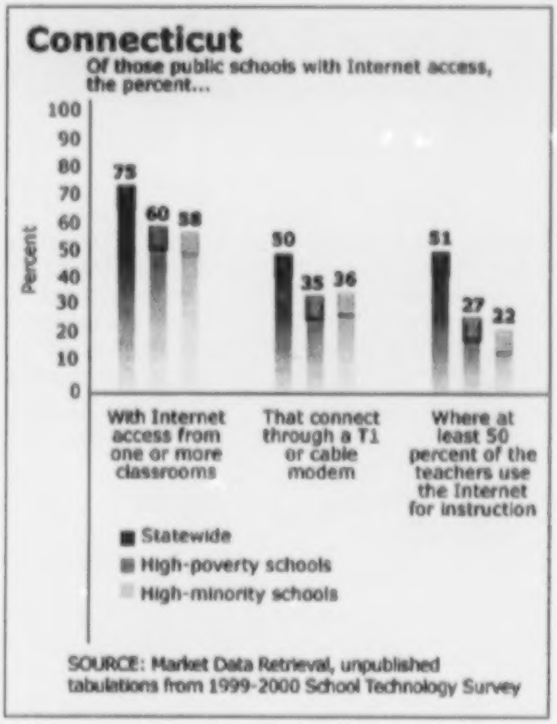
(See "Notes on State Profiles.")

After getting derailed by budget cuts, Connecticut's efforts to upgrade educational technology are back on track, as the state works to identify and address the varied needs of its schools better.

State lawmakers in 1999 approved a spending plan with almost no money earmarked specifically for educational technology. Previously, the legislature had allocated about $10 million a year, mostly for wiring. A push to resuscitate the state's commitment to technology was spearheaded by a group of state leaders, including Lt. Gov. M. Jodi Rell, a Republican. Partly at their prodding, lawmakers restored money for technology infrastructure--to the tune of $20 million for fiscal 2001--and even launched some initiatives to address the digital divide.

The legislature put $4.76 million for fiscal 2001 toward a new Connecticut Education Network to link schools, libraries, and higher education institutions via the Internet. Another $2 million went to a new "digital library" that supporters say will give schools access to a wealth of fresh online content.

"A school in an urban area like Bridgeport may not have the capacity to purchase all of the same kinds of library materials that a more affluent district can, but now we're putting all of the content out there so everyone can access it," says Judith B. Greiman, who chairs the Connecticut Commission on Education Technology, a panel formed to help plan and champion the state's school technology initiatives.



Connecticut

Of those public schools with Internet access, the percent...

SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

The legislature also established a new competitive-grant program, financed at $2.5 million this year, to support districts in designing new ways to train educators to make the most of their schools' technology. The state also channels funds from the federal Technology Literacy Challenge Grant program into a system of state-created regional service centers that offer training for teachers in technology, as well as in other skills.

Another new state program is the Parent Technology Academy, a modest $50,000-a-year initiative that will provide training in and access to information technology for parents in low-income areas. The state also has modified the way it divvies up money for wiring and other infrastructure. While much of the money had been awarded based on the quality of each district's proposals, each school system now gets at least $20,000. Most of the rest is given out on the basis of enrollment and poverty.

But the state is finding that its digital divide is more than a matter of haves and have-nots. While some of its largest districts have secured federal and private money for wiring and hardware, some smaller districts can't rally enough support. Meanwhile, many urban school leaders say they lack adequate funds to train teachers and to maintain what technology they have.

"What Connecticut needs is a way to address the needs of both the urban and the rural systems, and to move ahead equitably," says Hartford Superintendent Anthony S. Amato.

The technology commission plans to consider further revisions to the method the state uses to provide aid as a way to get at the problem. To see what needs exist, the panel is sponsoring an extensive audit of technology resources in Connecticut schools.

--Jeff Archer

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Delaware

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State Education Agency Web Site: www.doe.state.de.us/

State Education Agency Technology Contact:
Valerie Woodruff
(302) 739-4601
vwoodruff@state.de.us

Pre-K-12 Enrollment:114,000

Percent Children in Poverty:16.1

Percent Minority Students:38.4

Student per Instructional Computer:4.4

E-Rate Funding (through March 6, 2001):$3,786,339

(See "Notes on State Profiles."**)**

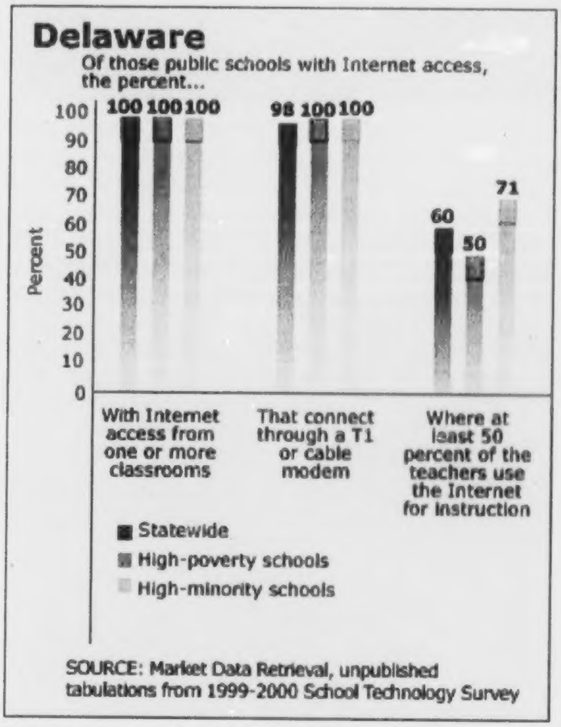
Wayne Hartschuh isn't too worried about technological inequities in Delaware's schools. That's because, he says, "there really is no digital divide in Delaware."

Hartschuh, the executive director of the Delaware Center for Education Technology, has reason for such confidence. Three years ago, his agency, a state-financed group that's independent of the education department, wired all of the state's public schools to the Internet. Now, the agency's job is to maintain what Hartschuh calls "the stuff you don't see"--the wires, cables, and lines. School districts, meanwhile, must maintain things like monitors and printers.

Efforts like those of the Delaware center are all part of an ambitious computer education technology plan the state embarked on three years ago.

Starting in July 1998, the First State spent $20 million over three years to put more computers in classrooms. The state spent $13 million, while counties chipped in the remaining $7 million.

The result: If it's a classroom, it's almost guaranteed to have a computer. Of the state's 6,832 classrooms, only 164, or about 2 percent, lack one. And those are gymnasiums and wood and auto shops, Hartschuh says.



SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

Not that all classrooms in the state have equal numbers of computers, Hartschuh concedes. Rural Woodbridge and Colonial counties, for example, have student-to-instructional-com ratios of 4.6- and 6.1-to-1, respectively. Those figures are slightly higher than the state average of 4.4-to-1.

Poor schools have especially benefited from the funding Hartschuh says. Walk into a typical poor school in the state, he says, and you're likely to find a fairly new Dell or Apple computer.

Every student in Delaware brings in the same allocation of state and local funding on a per-pupil basis. On average, the state picks up 70 percent of the cost for each student, while local districts pay the other 30 percent. But for poor schools, the state usually pays for 80 percent and the districts the remaining amount.

Delaware's schools have also been helped by the large presence of corporations in the state. Concerned by a shortage of high-tech workers, a number of companies have aimed to close what divide there is in the state's classrooms.

Take the Maryland Bank of North America. Since 1997, its nonprofit arm has set up several grant programs that aim to put better technology into poor classrooms, usually in schools where more than half the students receive subsidized meals.

The state's community college system has also gotten into the act. Delaware Technology and Community College, which has six campuses throughout the state, runs Saturday and summer programs for disadvantaged students that enable them to work on computers, says Lonnie George, the college president.

--Mark Stricherz

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District of Columbia

Education officials in the District of Columbia, where almost half the students live in poverty, say nearly every aspect of their school technology program works to bring resources to the poorest students and lowest-performing schools.

In addition to general fund dollars, Washington's school technology money comes from the federal Technology Literacy Challenge Fund, Title I programs, and a variety of private groups and businesses. The money is distributed on the basis of poverty levels and assessment data and through competitive grants, says Joseph W. Lane Jr., the school district's technology chief.

Many students in the district--more than 60 percent, according to Lane--do not have access to the Internet at home. So district officials are working with a number of boys' and girls' clubs, church groups, and other private organizations to bolster students' after-school opportunities for using technology. In addition, the district offers summer computer camps for 5th and 6th graders, and most schools offer after-school technology instruction. The camps are popular, Lane says, and the after-school programs, paid for through the federal Temporary Assistance to Needy Families program, are heavily used by students and their families and are also open to the public.

VITAL STATISTICS

State Education Agency Web Site:
www.k12.dc.us/dcps/home.html

State Education Agency Technology Contact:
Joseph W. Lane Jr.
(202) 442-5340
Joseph.Lane@k12.dc.us

Pre-K-12 Enrollment:79,000

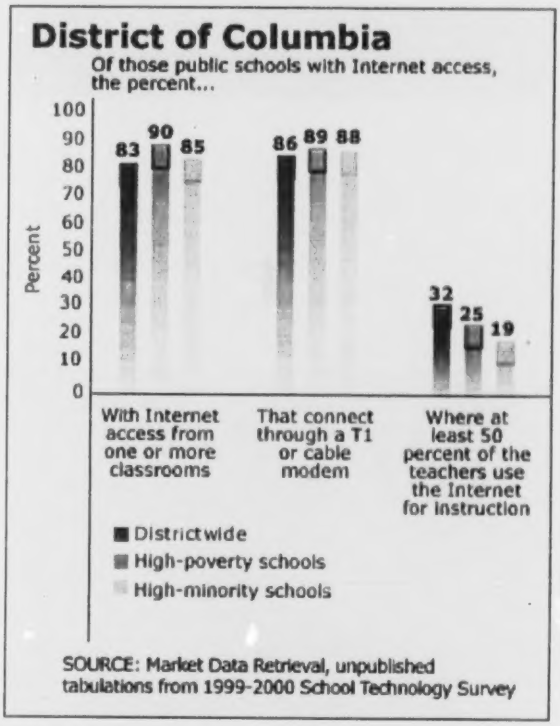
Percent Children in Poverty:45.3

Percent Minority Students:95.9

Student per Instructional Computer:5.8

E-Rate Funding (through March 6, 2001):$23,685,076

(See "Notes on State Profiles."**)**



SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

Currently, the school system has no technology standards for its students to meet, and thus no related tests or technology-related graduation requirements.

Virtually every school in district has a T1 line, which allows for high-speed work with large amounts of data on the Internet, and each school has at least eight places within the building that are wired for Internet connections, according to Lane.

District officials recently set a goal of having three new computers in every classroom, to be paid for with money from the federal Technology Literacy Challenge Fund. The district employs a team of 10 specialists to help connect computers and respond to technology-related problems at schools; two experts are employed to train teachers and coordinate vendor-provided training.

Beyond that, Lane says ongoing teacher professional development is a top priority for schools. Each teacher who receives a new computer or software for classroom use, for example, must complete at least six days of training over the course of the year, he says.

In addition to the district's own budget, a patchwork of government and corporate efforts underwrites teacher and administrator training, including the Technology Literacy Challenge Fund, Title I, and special grants from Bell Atlantic, MCI, and Intel.

--Kerry A. White

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Florida

In some respects, the results of Florida's steady contribution to school technology are obvious. For example, state officials tout the fact that Florida provides an average of one "modern" computer-- defined as Pentium-quality or better--for every five students.

Even so, despite investing more than $515 million in school technology over the past eight years, officials acknowledge that Florida is still struggling to narrow its digital divide.

State technology administrators now say they must work to improve classroom Internet connections and to improve computer access at home as well as in schools.

In the current budget year, fiscal 2001, the state legislature gave school districts $62.4 million--divided on a per-pupil basi--to acquire and install technology in classrooms. For fiscal 2002, though, "we made a request to increase that public technology fund by $32 million to complete good, reliable Internet access in every classroom," says Glenn Mayne, the director of technology for the Florida Department of Education.

According to Mayne, about 45 percent of Florida's classrooms still use dial-up and other sorts of access to the Internet "that can be somewhat difficult to use." Whether the legislature would provide the money to help address the problem was unclear, he said.

VITAL STATISTICS

State Education Agency Web Site:
www.firn.edu/doe/index.html

State Education Agency Technology Contact:
Glenn Mayne
(850) 487-8656
Mayneg@mail.doe.state.fl.us

Pre-K-12 Enrollment:2.4 million

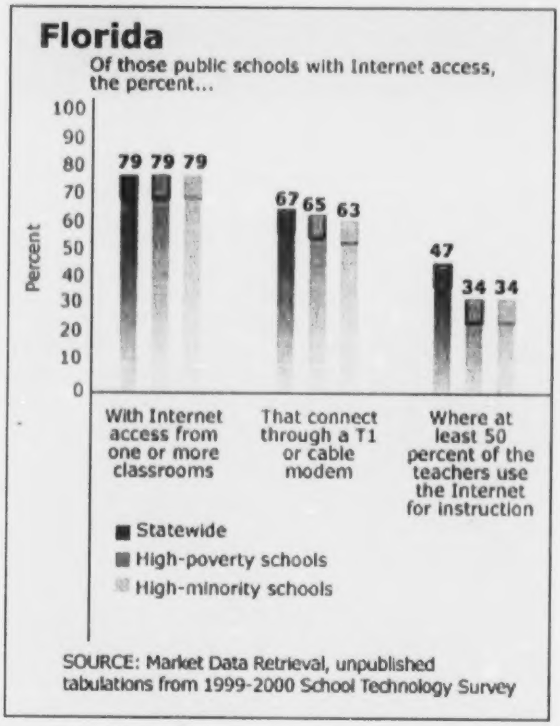
Percent Children in Poverty:21.9

Percent Minority Students:45.7

Student per Instructional Computer:4.2

E-Rate Funding (through March 6, 2001):$176,543,279

(See "Notes on State Profiles.")



SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

One way the state does help bring Internet access to schools is by supporting the Florida Information Resource Network, or FIRN, a statewide network linking school districts, community colleges, state universities, and libraries. For fiscal 2001, the legislature gave $6.5 million to FIRN.

The network offers Internet access to districts that pay to hook up to it, as well as technical assistance. "FIRN plays a direct role in trying to address the digital divide by making these technologies available," Mayne says.

Another state initiative that is under way to narrow the digital divide stems from Gov. Jeb Bush's office. Last summer, the Republican governor announced the "PowerUP Florida" initiative, which will spend $800,000 to establish at least 25 computer-lab sites at community centers around the state by the end of this year in partnership with PowerUP, a national organization that has helped create such sites across the country.

The purpose of the labs is to give students who don't have computers at home access to computers outside of school. As part of the effort, Bush has also asked local businesses to provide mentors to teach children how to use the technology.

"Our PowerUP Florida initiative will provide disadvantaged youth with critical technological tools and training to ensure that they are not left behind in this rapidly changing digital age," Bush said at the time of the announcement.

Mayne says Florida also works to narrow the digital divide by steering federal technology money to needy schools. In considering applications for Technology Literacy Challenge Fund grants, for example, Florida officials give bonus points to low-performing schools and to those located in economically disadvantaged areas.

--Jo Anna Natale

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Georgia

Education officials in Georgia are working in a variety of ways to bring high-speed Internet access to all students in the state and to encourage teachers and students to integrate the Web into the curriculum.

The state education department provides Internet access via T1 lines to nearly all of Georgia's 180 school districts, which are then responsible for hooking schools up through a wide-area network. Department officials are now working with about 12 districts that have not yet been able to set up those networks.

VITAL STATISTICS

State Education Agency Web Site: www.doe.k12.ga.us/

State Education Agency Technology Contact:
Billie Sherrod
(404) 657-0810
bsherrod@doe.k12.ga.us

Pre-K-12 Enrollment:1.4 million

Percent Children in Poverty:23.3

Percent Minority Students:44.5

Student per Instructional Computer:4.7

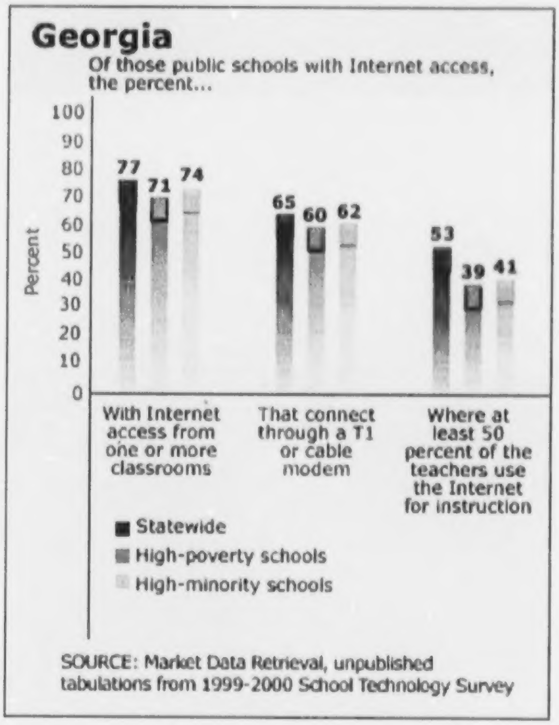
E-Rate Funding (through March 6, 2001):$206,738,601

(See "Notes on State Profiles.")

"In rural areas, it's difficult to get the technology staff, even if you have the funding," says Billie Sherrod, the department's associate superintendent for technology services.

The legislature took steps last year to help all districts gain more technology expertise, by agreeing to pay for one technology specialist for every 1,100 students. Previously, one such position was allotted for every four schools.

The state, which is spending about $65 million on technology in the current fiscal year, is also trying a method that will give schools in high-needs districts a better chance at earning grants from the Technology Literacy Challenge Fund. The federal government provides funding through that program to each state; districts then apply for grants.


Georgia

Of those public schools with Internet access, the percent...

SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

While Georgia has always given extra "points" in the process to districts with lower test scores, higher percentages of poor children, and higher student-to-computer ratios, a portion of the money the state receives will now be set aside especially for districts that meet those criteria.

Another state source of money for technology is Georgia's lottery; some of its proceeds must be used for computer hardware and software. The money is distributed to schools on a per-student basis.

To help teachers use the Web as they teach the curriculum, the state has been posting lesson plans based on state standards on a Web site called Georgia Learning Connections. The education department is also in the final stages of preparing technology standards for students that will eventually be integrated into the subject areas of the curriculum. The standards will be presented to the state school board for approval in the fall. New teacher-training requirements will also take effect soon.

As of July 1, 2002, new Georgia teachers and those earning their recertification will have to pass a technology competency test or take a course. So far, 46 schools in the state have all of their teachers trained, according to Jane Royall, the acting director of education technology for the education department.

"We hope," Royall says, "that teachers will be trained in the next five years to make those curriculum connections better."

--Linda Jacobson

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Hawaii

Hawaii education officials are hoping they can soon outfit schools with some badly needed computers. But first, the legislature will have to pass Gov. Benjamin J. Cayetano's $21 million technology plan.

If approved this spring, all of the money would be used for hardware, which would lower the student-to-computer ratio from an average of 6-to-1 to 4-to-1 in every school across the state, says Diana K. Oshiro, the assistant superintendent for the division of learner, teacher, and school support in the Hawaii Department of Education.

Capital-improvement money would be used to provide the necessary wiring.

VITAL STATISTICS

State Education Agency Web Site:
www.k12.hi.us/

State Education Agency Technology Contact:
Diana K. Oshiro
(808) 586-3307
diana@hawaii.edu

Pre-K-12 Enrollment: 184,000

Percent Children in Poverty: 15.1

Percent Minority Students: 79.5

Student per Instructional Computer: 5.8

E-Rate Funding (through March 6, 2001): $13,795,026

(See "Notes on State Profiles.")

To roll out the new equipment in an equitable manner, the education department devised a formula that would be used to determine which schools will receive top priority. Schools with high percentages of children in poverty or low achievement rates would be at the top of the list, while new schools--which were built with technology already in place--would be at the bottom.

Oshiro says the plan is for technicians to work from both ends of the list and meet somewhere in the middle when all the work is complete. Since new schools in this single, statewide school system already have up- to-date equipment, they could be brought up to the 4-to-1 ratio relatively quickly, Oshiro says.

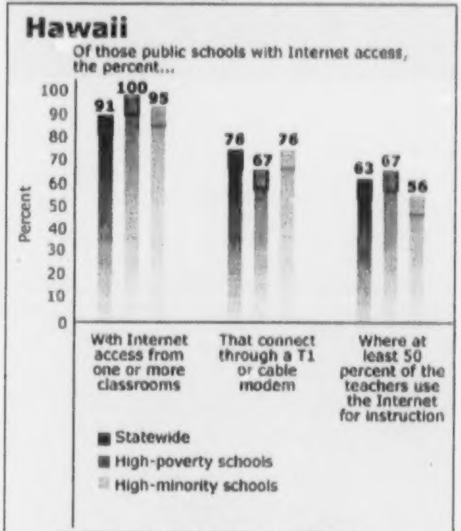
While every school in the state has access to the Internet, that access has not yet reached all of the classrooms. About 85 percent of the classrooms are connected, Oshiro says.

All schools on the island of Oahu have access through a cable modem, while the high schools on the neighboring islands are connected by a T1 line. Some schools, though, still have slower connections.

The state is also increasing opportunities for teachers to receive training online, with the goal of helping them better integrate technology into the curriculum. Because of a recent reorganization of the education department, Hawaii is now placing a greater emphasis on professional development, Oshiro says.

In addition, the department is addressing the needs of some students through its Electronic School, or "E-School," which provides online high school classes. For example, through a partnership with the University of Hawaii, some students will be studying marine biology this coming fall and spending a lot of time on a boat while they earn their high school credits for core courses through E-School. The online school is especially useful to students living in rural areas where certain courses are not available because there aren't enough teachers or other students who are interested, Oshiro says. She and others originally thought students would use E-School to "just accelerate and get out

of school." But instead, she says, they are taking more than just the required courses and are "graduating with tons more credits."



SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

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All schools on the island of Oahu have access through a cable modem, while the high schools on the neighboring islands are connected by a T1 line. Some schools, though, still have slower connections.

The state is also increasing opportunities for teachers to receive training online, with the goal of helping them better integrate technology into the curriculum. Because of a recent reorganization of the education department, Hawaii is now placing a greater emphasis on professional development, Oshiro says.

In addition, the department is addressing the needs of some students through its Electronic School, or "E- School," which provides online high school classes. For example, through a partnership with the University of Hawaii, some students will be studying marine biology this coming fall and spending a lot of time on a boat while they earn their high school credits for core courses through E-School. The online school is especially useful to students living in rural areas where certain courses are not available because there aren't enough teachers or other students who are interested, Oshiro says. She and others originally thought students would use E-School to "just accelerate and get out of school." But instead, she says, they are taking more than just the required courses and are "graduating with tons more credits."

--Linda Jacobson

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Idaho

Idaho is encountering some obstacles in its attempt to put instructional technology in every school. The state has put a lot of money into teacher training and telecommunications connections, but officials say the training has progressed more smoothly than the connecting.

Idaho's largest digital divide is between rural and urban districts, according to Dawn Wilson, the state educational technology coordinator. But the state is having trouble connecting some rural districts because the telecommunications systems to support technology are not yet in place in remote areas, she says.

"A bunch of our areas can't get extended 911 service either; the infrastructure just isn't there," she notes.

The education department cannot afford to connect schools unless the wiring is already available.

For schools that are connected, Wilson says, the state tried to negotiate a contract with telecommunications companies to charge districts a flat rate for their connections, including those in remote areas. That would have helped poorer rural districts afford connection, "but it didn't go," she says.

The state will look at a new contract later in the year, but it has more than 100 telephone companies that would all have to agree to the contract.

VITAL STATISTICS

State Education Agency Web Site:
www.sde.state.id.us/Dept/

State Education Agency Technology Contact:
Dawn Wilson
(208) 332-6971
dwilson@sde.state.id.us

Pre-K-12 Enrollment:246,000

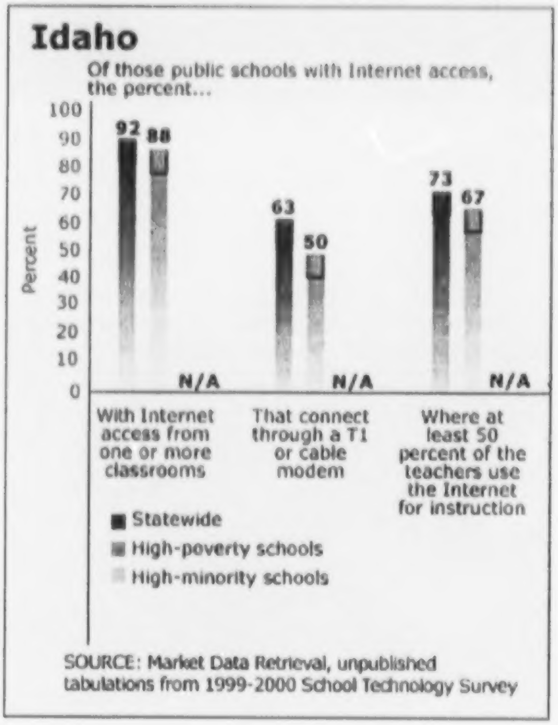
Percent Children in Poverty:20.1

Percent Minority Students:13.3

Student per Instructional Computer:3.8

E-Rate Funding (through March 6, 2001):$11,998,475

(See "Notes on State Profiles.")



SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

In spite of such difficulties, 87 percent of Idaho classrooms are connected to the Internet, according to a June 2000 survey. The Idaho State Technology Initiative allocates $10.4 million to districts annually, based on average-daily-attendance rates, and has spent similar amounts for six years, Wilson says. Districts spend state money on their state-approved technology plans, which could include hardware, software, support, and training.

Idaho also has put together a statewide professional-development program that requires 90 percent of teachers to be certified in basic-technology skills by July. As of February, 72 percent of teachers had completed the certification.

Advanced courses for classroom use of technology, based on the standards for teacher learning set by the International Society for Technology in Education, are in development.

After July, whether teachers are certified in technology will affect school accreditation. Schools will have to explain why any teacher is not yet certified, Wilson says.

The focus of the training program is to ensure that students have teachers who can use technology to improve learning in the classroom. With most teachers now trained to integrate technology, the state was planning to look at adopting the society's standards for student learning in April, according to Wilson.

--Vanessa Dea

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Illinois

In Illinois, closing the digital divide hasn't been a top priority for several years. While the state is in the final year of a four- year, $100 million program to put more computers in classrooms, the political and business establishments have focused on achieving other educational goals recently.

Started in July 1997, the Technology Integration Program devoted its entire $24.4 million first-year budget to poor schools, judged to be in the bottom quartile of schools based on local property values. The program provides money to buy computers, train teachers, and supply teaching materials for all K-12 students.

In the three years that followed, close to $25 million annually went to schools in the other three income quartiles.

VITAL STATISTICS

State Education Agency Web Site:
www.isbe.state.il.us/

State Education Agency Technology Contact:
Lugene Finley, Jr.
(217) 782-5596
lfinley@isbe.net

Pre-K-12 Enrollment:2 million

Percent Children in Poverty:13.5

Percent Minority Students:39.3

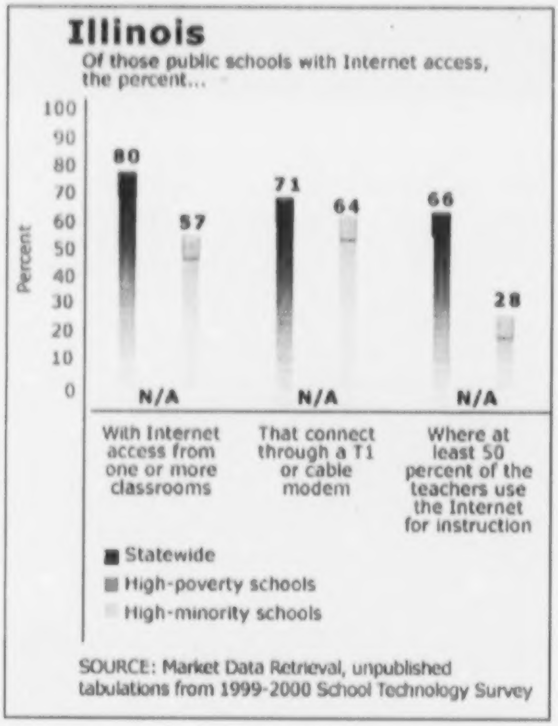
Student per Instructional Computer:4.9

E-Rate Funding (through March 6, 2001):$356,560,264

(See "Notes on State Profiles.")

Aside from that effort, political and business leaders have supported aid for only a handful of small-scale programs for poor schools.

One is a $1 million annual state fund to establish 15 or 20 "community technology centers" around the state, says Lori Clark, the deputy director for the bureau of technology at the Illinois Department of Commerce and Community Affairs. The centers will be located in poor and rural schools and in civic buildings. Businesses will donate computers, and full-time state employees will staff the centers, Clark says.



SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

A similar program is run by the Chicagoland Chamber of Commerce, which represents 2,500 businesses in and around the Windy City.

For the past four or five years, about 250 companies have donated old computers and hardware to schools, most of which serve students from poor families, says Peggy Luce, the group's vice president.

"There is a priority that [poor] schools get more computers," Luce says.

Another effort was the result of last year's merger between telecommunication giants Ameritech and sbc Communications Inc. Because of a requirement by a state agency, the new company--called SBC Communications Inc.--has created a nonprofit foundation that will give grants to poor and rural communities.

The foundation plans to give $3 million over three years, some of which will go to schools, especially for buying computer hardware.

For other Illinois business interests, narrowing the digital divide has taken a back seat to other educational goals.

"At the [Illinois] Business Roundtable, our focus has been on broader issues, like high standards and teacher quality," says Richard B. Laine, the director of education for the Chicago-based organization, which represents 65 of the state's most powerful corporate ceos.

While he considers bridging the digital divide important, Laine adds, "we're focusing on more higher-impact pieces."

--Mark Stricherz

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Indiana

Indiana has several initiatives to address its digital divide?with more plans under discussion?but state administrators there say paying for the efforts may become more difficult.

"Our state budget forecasts are coming in less than anticipated, so who knows how it will all shake out," says Michael Huffman, the special assistant for technology to the state schools superintendent.

The legislature is expected to approve a budget by June. One hope among school technology champions is that lawmakers will give Indiana's Technology Plan Grant Program $20 million per year in the biennium that begins July 1. The program, which previously ran in a five-year cycle, is up for reauthorization.

VITAL STATISTICS

State Education Agency Web Site: www.doe.state.in.us/

State Education Agency Technology Contact:
Michael Huffman
(317) 232-6672
mhuffman@doe.state.in.us

Pre-K-12 Enrollment: 989,000

Percent Children in Poverty: 12

Percent Minority Students: 15.7

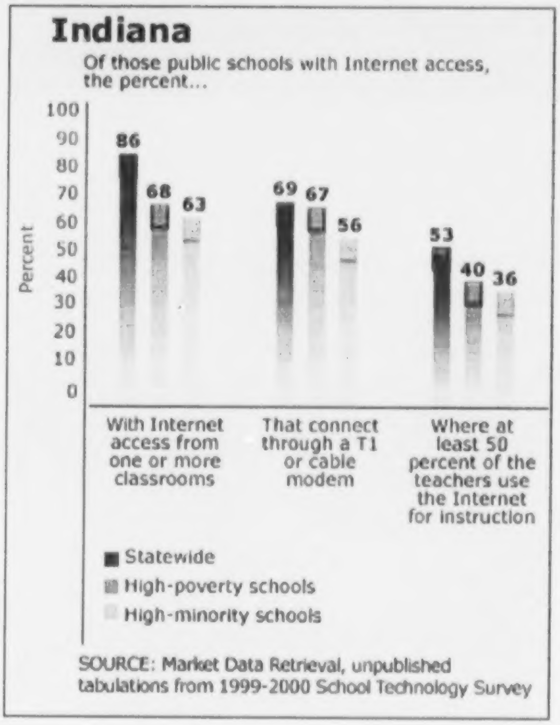
Student per Instructional Computer: 3.7

E-Rate Funding (through March 6, 2001): $64,049,012

(See "Notes on State Profiles.")

Financed with proceeds from lotteries, riverboat gambling, and horse races, the grant program awards districts technology money on a per-pupil basis. In past years, districts have received from $100 to $200 per student, with the state specifying that 30 percent go to teacher training.

In the coming school year, state officials want to give the money first to poorer school districts-those in communities with lower assessed property values. The state did give poorer districts priority funding?at a rate of $200 per pupil?in the program's first cycle.



SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

A few other programs attempt to address the inequities between school and home. One program, forged in a contract between Gateway, Inc., and the state, allows parents of Indiana schoolchildren to buy a Gateway computer and receive Internet access at what state officials call a "significant discount." One possible payment plan: Buyers can get a new Gateway computer, including Internet access, for $24.07 a month for 48 months.

Another initiative, the Buddy System Project, gives computers to 4th graders who don't have them at home. Begun in 1988, the program today runs in 60 schools and involves 9,000 families, according to Marvin Bailey, who administers the program through a state-financed nonprofit agency. In the current biennium, $3 million went to the program?the same amount sought in the next budget.

Still on the drawing board is a program called Realizing Equitable Access to Computers at Home, or reach. It would provide 9th graders who qualify for free or reduced-price lunches with free computers for use at home. The program would cost $7.5 million a year, says Terry Spradlin, the legislative liaison for the state education department.

Another program,the Indiana Virtual Education System, would make Advanced Placement and other courses available online. "It would deliver courses to small schools that don't have resources," Huffman says. Officials are seeking $3.5 million in the next biennium for that project.

To assess its digital divide and its overall technology efforts, Indiana last year began an annual technology survey. Among the findings: More than two-thirds of schools have a student-to-computer ratio of 8-to-1 or lower. But 16 percent reported a ratio greater than 33-to-1.

—Jo Anna Natale

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Iowa

Iowa has worked to diminish the digital divide for several years, primarily by providing schools with access to a sophisticated fiber-optics network.

The Iowa Communications Network, the only completely state-operated telecommunications network in the nation, was created in the mid-1980s to give residents in rural areas the same educational opportunities as those in urban areas. Nearly every school district is now connected to the icn, with most of the connections located in high schools.

In linking to the network, schools get access to the Internet via a T1 line or an even better connection; distance-learning capability, using full-motion, interactive video conferencing; and long-distance telephone service. The network also connects the state's government agencies, public universities and community colleges, most of its independent colleges and universities, numerous public libraries, and hospitals.

Iowa now faces the question of how to give other schools within the K-12 system the same opportunity. "We need to figure out a strategy to help elementary and middle schools get connected," says Pamela Adams Pfitzenmaier, the director of educational telecommunications at Iowa Public Television.

VITAL STATISTICS

State Education Agency Web Site:
www.state.ia.us/educate/

State Education Agency Technology Contact:
Pamela Adams Pfitzenmaier
(515) 242-4180
pam@iptv.org

Pre-K-12 Enrollment: 497,000

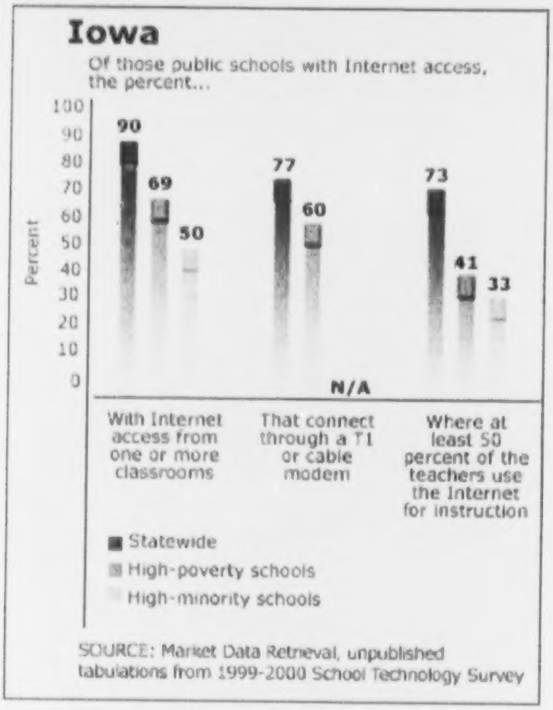
Percent Children in Poverty: 15.4

Percent Minority Students: 9.2

Student per Instructional Computer: 3.8

E-Rate Funding (through March 6, 2001): $20,526,812

(See "Notes on State Profiles.")



SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

So far, federal rather than state dollars have gone toward the cause. This school year, the state received $3.7 million in Star Schools money to connect elementary and middle schools, Pfitzenmaier says-far short of the $26 million Iowa had requested for the project.

Gov. Tom Vilsack, a Democrat, now wants to use the icn to improve Iowa's "learning infrastructure" beyond its schools, says Richard Varn, the director of the state's information technology department.

In December, Vilsack created a task force to assess where the digital divide exists in Iowa and to determine how changes in state policy could narrow it. The group includes educators, librarians, and telecommunications officials.

According to Varn, the task force will try to figure out ways to make more educational resources available to "learners from pre-K to gray." The governor's plan aims to do that by "exploding the Iowa Communications Network's capacity and increasing its value and delivery to citizens," Varn says.

In the meantime, the legislature has set aside $30 million a year for school technology since 1996. The money typically goes to districts on a per-pupil basis to be spent on hardware, software, and connection to the Internet.

This year, however, the legislature gave the districts more flexibility in how they spend the money. In fiscal 2002, Pfitzenmaier says, districts will be allowed to use up to two-thirds of their share to reduce primary-grade class sizes, a change that some people worry will slow districts' progress in implementing technology.

—Jo Anna Natale

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Kansas

Due to Kansas' long tradition of locally controlled schools, the state has played only a minor role in integrating technology into its classrooms. That could change, though, if the legislature passes a bill this session aimed at setting up a statewide telecommunications network over the next few years--a move proponents say could help narrow the digital divide in this mostly rural state. For their part, district administrators "have done an amazing job" of bringing technology to their schools despite having little money to do so, says Greg Rasmussen, the state coordinator of education technology.

VITAL STATISTICS

State Education Agency Web Site: www.ksbe.state.ks.us/

State Education Agency Technology Contact:
Sal Tayani
(785) 296-7931
stayani@ksbe.state.ks.us

Pre-K-12 Enrollment:470,000

Percent Children in Poverty:12.9

Percent Minority Students:20.3

Student per Instructional Computer:3.3

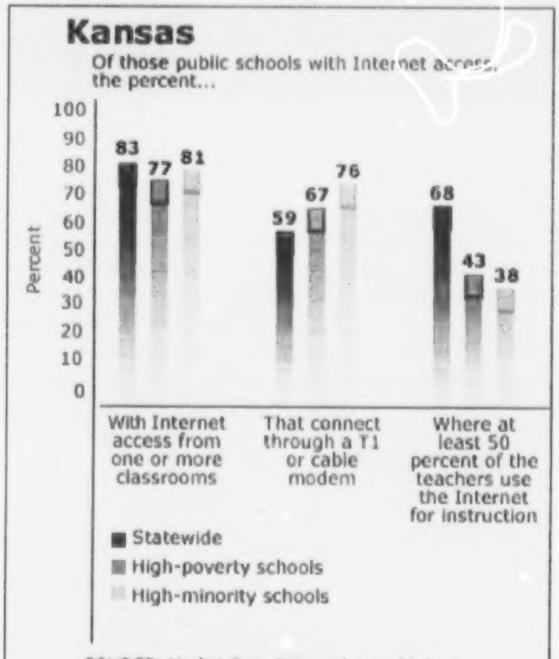
E-Rate Funding (through March 6, 2001):$33,078,965

(See "Notes on State Profiles.")

The state earmarked funding for technology only once, two years ago. Each of the 304 districts currently receives a lump sum from the state for all school expenditures, and the localities determine how best to allocate it.

Critics charge that the state's hands-off approach is hurting students in all communities, especially those attending rural schools that don't have the money or know-how to purchase and utilize technology in meaningful ways. Many are at the mercy of the state's battery of small, private phone companies that do not yet offer technology-ready telephone lines that are necessary to connect computers to the Internet, says Carol A. Peak, the director of the Kansas Center for Rural Initiatives at Kansas State University in Manhattan.

"We have significant issues to deal with in Kansas," Peak says. "Currently, we have a disjointed infrastructure that pits private [phone companies] against one another. They hold small communities hostage."



SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

Nevertheless, Kansas has a lower ratio of students to Internet-connected computers than the national average, 6-to-1 compared with 7.9-to-1.

And, while only 59 percent of the Internet-connected schools throughout the state are hooked up to speedy T1 lines or cable modems, in comparison with 67 percent nationally, districts have made those speedy connections a priority in high-poverty schools, state officials say. Sixty-seven percent of those schools have such links, compared with 63 percent of high-poverty schools nationally.

The challenge in Kansas, then, is to teach educators to integrate the technology they already have into their daily lessons, Rasmussen says.

While some federal dollars are being allocated for teacher professional development in technology, more districts need to devote money to that purpose, he says.

What's more, many districts have difficulty hiring and keeping the staff members needed to fix and upgrade technology, Rasmussen says, adding that the problem is most troubling in rural districts.

The proposed statewide technology network could help alleviate those problems by providing coaching for teachers and online computer technicians, he says. It would also work to bridge the digital divide by providing coursework and other interactive learning experiences via the Web that are now unavailable in many communities.

And the network, by offering inexpensive courses and services, could help preserve the many rural districts now strapped for cash because of declining enrollments. Without such services, it will be harder for them to remain open.

Peak, however, says that such an effort, while needed, won't "reverse the brain drain and save small communities."

It would be years before a network could be launched. As of April, lawmakers in the House and Senate had separately approved bills that would provide $500,000 to complete preliminary research on such a system. They were faced with coming to consensus on the package before the legislature's adjournment in April.

--Julie Blair

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Kentucky

Seven years ago, Kentucky's 15 wealthiest districts had one classroom computer for every 95 students, while the 15 poorest had one for every 153 students. Today, that gap has been virtually wiped out.

At the beginning of this school year, the poorest districts had a student-to-computer ratio of 6.1-to-1, compared with 5.5-to-1 for the richest, according to state data.

The Bluegrass State accomplished the feat by carefully defining what technology every school should have and then sending cash to the districts furthest away from those goals, says David Couch, the associate commissioner for education technology for the state department of education.

"Everything we've done is to drive equity," Couch says. Kentucky set specific goals for all its schools, stating that each should have a local-area network and a student-to-computer ratio of at least 6-to-1, among other benchmarks. Every year, school districts received grants based on their "unmet need"; districts were required to match the state grants, but several spent above the matching amounts.

Couch says the process ensured that the districts with the greatest need received the most money. The state is spending $73 million, or $128 per student, on technology this school year.

VITAL STATISTICS

State Education Agency Web Site:
www.kde.state.ky.us/

State Education Agency Technology Contact:
David Couch
(502) 564-2020, ext.229
dcouch@kde.state.ky.us

Pre-K-12 Enrollment:623,000

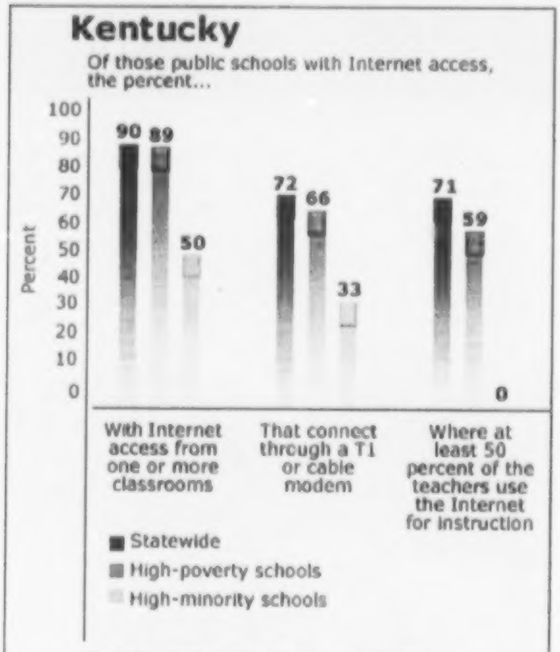
Percent Children in Poverty:18.6

Percent Minority Students:11.9

Student per Instructional Computer:4.2

E-Rate Funding (through March 6, 2001):$133,318,700

(See "Notes on State Profiles.")



SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

At the same time, the education department centralized purchasing for all school technology equipment and services. The statewide buying power gave the same discounts to the poorest communities, many of which are in remote rural areas, as to wealthy areas.

As a result, high-poverty schools in Kentucky are significantly better off than most such schools elsewhere. For example, 89 percent of the state's high-poverty schools have at least one classroom with Internet access, compared with 76 percent in the rest of the country. Kentucky's poor schools have an Internet-connected computer for every eight students, while the national average for high-poverty schools is one such computer for every 10.4 students. In eastern Kentucky--one of the poorest rural areas in the nation--schools are on a technological par with some of the most affluent areas in the state. The 1,100-student Elliott County school district in Sandy Hook has 440 computer workstations in its 89 classrooms. All of them are connected to the Internet through a T1 line.

"It has ended our isolation," says Randall R. Evans, the district's technology coordinator. "We have the whole world at our fingertips. We can get any resource we need now."

State officials are now focusing on ensuring that teachers have the know-how to make technology an everyday part of their instruction, Couch says. The strategy is to place technology-resource teachers in schools to work individually with their peers at using technology as a teaching device, not just a productivity tool.

--David J. Hoff

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Louisiana

Louisiana has put considerable effort--and money--into expanding student access to educational technology over the past several years, but tight financial times are putting the squeeze on scarce state resources.

The Louisiana Center for Educational Technology, run by the state education department, proudly proclaims on its Web site that the ratio of students per computer has plummeted from 88-to-1 in 1996 to 8-to-1 in 2000. Yet the primary state funding source for technology, the Classroom-Based Technology Fund, has steadily declined from a high of $37 million in 1997 to just $5 million this fiscal year.

VITAL STATISTICS

State Education Agency Web Site:
www.doe.state.la.us/DOE/asps/home.asp

State Education Agency Technology Contact:
Chris O'Neal
(225) 763-5575
coneal@lcet.state.la.us

Pre-K-12 Enrollment:743,000

Percent Children in Poverty:29.2

Percent Minority Students:50.8

Student per Instructional Computer:6.8

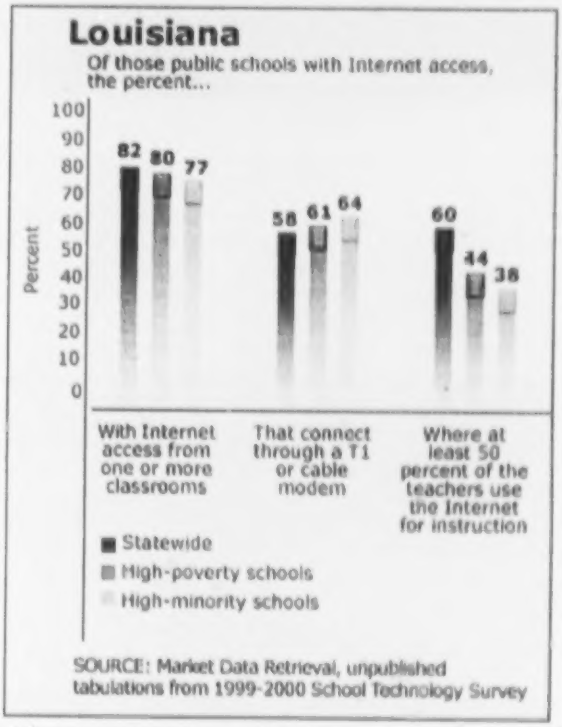
E-Rate Funding (through March 6, 2001):$103,219,670

(See "Notes on State Profiles.")

While the program provides money to school systems on a per-pupil basis, districts are required to direct the money to schools and classrooms with the greatest need for technology, as determined by an annual inventory, and those that demonstrate on their grant applications a genuine commitment to integrating technology into the curriculum, such as promising that teachers will take part in related professional development.

"The whole state is financially strapped right now," says Chris O'Neal, the state director for educational technology at the Louisiana Department of Education.

He says the department is hoping to get a steady stream of $10 million annually into the technology fund.



SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

"We've got a long way to go before I'd be satisfied to say we've closed the digital divide," O'Neal says.

The fund is not the only state effort to help with technology in schools. Last year, the education department, in partnership with the state library system, launched an online database that provides libraries and public and private schools with access to extra academic resources through the Internet, such as encyclopedias, thesauruses, and full-text periodicals.

The state also provides some programs for professional development in educational technology. For example, Louisiana intech is a 56-hour staff-development program that has trained about 3,500 teachers over the past 21/2 years in using technology-based strategies to improve instruction. Preference goes to teachers in schools that enroll traditionally underserved students.

Louisiana also offers a statewide distance-learning program that has satellite and Web-based courses, including a new virtual-classroom project providing high school courses online.

On another front, the Bill and Melinda Gates Foundation has provided a three-year, $1.2 million grant to the state for a program called leadTech, which is designed to help superintendents and principals gain a better understanding of how technology can improve schools and foster student learning.

--Erik W. Robelen

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Maine

Even though Maine is just now laying the groundwork for its first statewide school technology push, it has managed to avoid a digital divide in its classrooms.

In surveys conducted in the past two years, the state found that access to technology varied little across the state. The results even suggested that students in some of the poorest areas had some of the best access to technology.

According to the 1999 survey, elementary schools where more than 63 percent of the students received free or reduced-priced meals had one computer for every 11.5 pupils, compared with one computer for every 15.9 students in elementary schools where less than one-quarter of the pupils fell under that category. "We have several districts around the state that are relatively rural and relatively poor that have been real leaders in educational technology," says Yellow L. Breen, the director of special projects for the state department of education. "There's a real digital divide at home, but there's not clear trends once the students come to school."

In a fall 2000 survey of teachers, the department found that almost 90 percent of teachers had a computer in their classrooms, and about 80 percent of all teachers had a computer that was connected to the Internet.

VITAL STATISTICS

State Education Agency Web Site:
www.state.me.us/education/homepage.htm

State Education Agency Technology Contact:
Ed Gomes
(207) 287-5640
Ed.Gomes@state.me.us

Pre-K-12 Enrollment:213,000

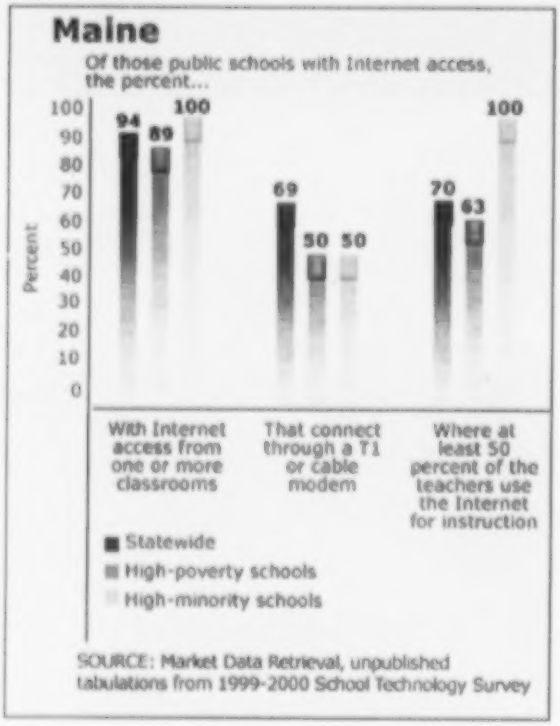
Percent Children in Poverty:14

Percent Minority Students:3.2

Student per Instructional Computer:4.6

E-Rate Funding (through March 6, 2001):$10,073,755

(See "Notes on State Profiles.")



SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

So far, however, the use of computers remains at a basic level, the poll suggests. Only 28 percent of teachers use computers "several times a week" or "daily" to search the Internet. Almost half never use computers to "solve problems or analyze data"; the same proportion never "produce multimedia reports" with computers.

Every high school in the state, meanwhile, has access to a distance- learning network that broadcasts courses over the Internet on a high-speed, fiber-optic connection. Schools can use the network to schedule courses taught from afar in subjects they otherwise couldn't offer, such as Japanese or archaeology.

Now, the legislature is debating whether to establish Maine's first large-scale program to add more computers in schools. Gov. Angus King, an Independent, has proposed a $50 million endowment that would buy a laptop computer for every 7th and 8th grader in the state. The students would get to keep their computers and use them through high school.

An advisory commission is recommending that the state broaden the program's agenda. In addition to buying portable computers, the task force says, the program needs to provide professional development for teachers so they know how to integrate technology into the curriculum.

Whatever form it takes, the program's goal is to achieve a one-to-one computer-to-student ratio, Breen says. If it succeeds, the initiative will wipe out the digital divide in students' homes, he says.

The legislature is scheduled to decide on the scope of the program before it recesses this spring.

--David J. Hoff

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Maryland

Maryland has made real progress in getting computers into classrooms and in expanding Internet access since launching its state technology plan in 1995. But officials there say they now confront a greater challenge: ensuring that students in every school use technology to its fullest capabilities.

"For the past several years, our focus has been on building infrastructure," says Barbara Reeves, the director of instructional technology for the state education department. "But this is really the start of the crusade" for advanced use, she says.

A survey by the department and the Maryland Business Roundtable for Education has helped prompt that crusade. The results, released in January, show that students from wealthier communities—those where fewer than 11 percent of the students receive free or reduced-price school lunches-are more than twice as likely as students from poorer communities—where more than 70 percent receive such meals—to use technology to gather, organize, and store information. In addition, the students from the better-off areas are three times more likely to use technology to perform measurements and collect data.

The disparities go "not to the heart of technology, but to the heart of instruction," says June Streckfus, the executive director of the Maryland roundtable, a coalition of 120 businesses that works to bring technology to schools. "In high-poverty schools," she observes, "there's much more drill and practice than in low-poverty schools."

The inequities and how to address them will be central themes in Maryland's renewed technology plan, due out in December, Streckfus says.

VITAL STATISTICS

State Education Agency Web Site: www.msde.state.md.us/

State Education Agency Technology Contact:
Barbara Reeves
(410) 767-0382
Breeves@msde.state.md.us

Pre-K-12 Enrollment: 853,000

Percent Children in Poverty: 6.9

Percent Minority Students: 45.7

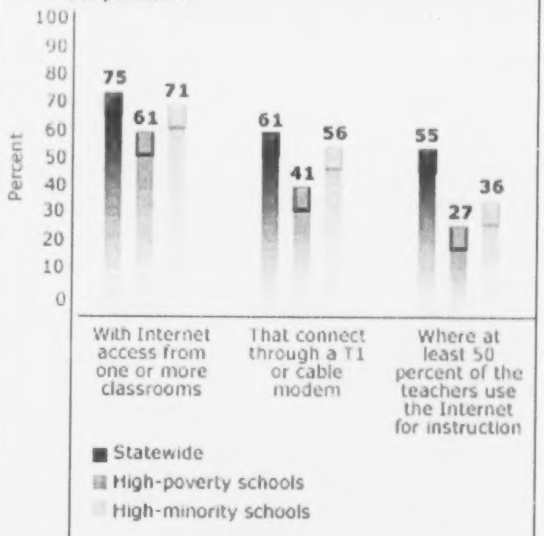
Student per Instructional Computer: 5.6

E-Rate Funding (through March 6, 2001): $55,892,871

(See "Notes on State Profiles.")

Maryland

Of those public schools with Internet access, the percent...



SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

Meanwhile, the state has several efforts under way to help bridge gaps. One, Reeves says, aims to help would-be teachers learn to integrate higher uses of technology into lessons. The state, with the aid of a federal grant, is developing technology- related tests that future teachers will have to pass before gaining teaching credentials.

Other initiatives include the Maryland Technology Academy, which offers teachers summer instruction at Towson State University as well as regional seminars.

While the state works to improve instruction, it does so with a strengthened infrastructure. According to the recent survey, the ratio of students per mid- to high-capacity computer is 6-to-1, compared with 16-to-1 in 1995. The state's goal is 5-to-1.

Internet access also has improved since 1995, when 23 percent of Maryland classrooms could use the Internet. Today, 72 percent can.

But that overall statistic masks the situation in the Baltimore school system, one of the state's poorest districts, where just 33 percent of the classrooms now have Internet access. Help is on the way, though: The Maryland legislature last year reduced the district's required match for state technology dollars from 25 percent to 5 percent.

In all, the legislature earmarked $62.9 million for technology in fiscal 2001, up from $15.9 million the year before.

—Jo Anna Natale

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Massachusetts

Just five years ago, computers in the Boston public schools were often more than a decade old, and most students had to wait in line to use them. With a computer-to- student ratio of 1-to-63, schools had little opportunity for incorporating technology into the curriculum in any significant way.

Today, with strong backing from city leaders, an engaged business community, and focused school administrators in the 63,000-student district, access to and sophisticated use of technology has become a systemwide priority.

"Our plan is like an enormous jigsaw puzzle that fits together," Ann Brady, the district's director of instructional technology, says in explaining how the school system has tapped multiple resources in its efforts to shore up its technology.

State leaders also are on board. Nearly 80 percent of Massachusetts' classrooms are now connected to the Internet. The state has devoted $3.5 million for Mass Ed Net, which provides free Internet access to about 80,000 public school educators.

VITAL STATISTICS

State Education Agency Web Site:
www.doe.mass.edu/

State Education Agency Technology Contact:
Connie Louie
(781) 338-6865
clouie@doe.mass.edu

Pre-K-12 Enrollment: 985,000

Percent Children in Poverty: 13.8

Percent Minority Students: 23.4

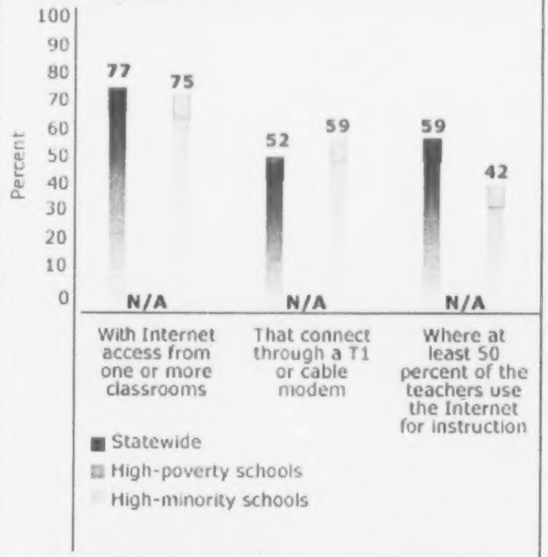
Student per Instructional Computer: 5.2

E-Rate Funding (through March 6, 2001): $98,548,501

(See "Notes on State Profiles.")

Massachusetts

Of those public schools with Internet access, the percent...



SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

Schools with large concentrations of students from poor families receive priority when technology grants go out. And Boston was one of a handful of school districts nationwide that were awarded grants from the U.S. Department of Education to support teacher professional development designed to improve the use of technology in the classroom. Boston received $6 million.

For Connie Louie, the instructional-technol director for the Massachusetts Department of Education, bridging the digital divide begins with tech-savvy teachers.

"You can have all these computers in a school, but the teachers need to know the content well and be able to share it with the students," she says.

Massachusetts also has turned to businesses and foundations to help increase its technology resources.

The Boston Digital Bridge Foundation, a nonprofit organization that runs a "Technology Goes Home" program, works with community centers to help train entire families to use computers. After completing the training, families that might not otherwise have access to technology at home receive computers.

High-tech executives founded the program, whose partners include the Microsoft Corp. and America Online, Inc.

—John Gehring

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Michigan

Until now, Michigan's roughly 500 districts have largely been left to chart their own courses on school technology, using state aid and local bond money as they see fit.

As a result, small, rural districts in particular have had a hard time keeping up, state leaders say.

"We've probably been in the middle of the pack" among the states in school technology use, says Jamey T. Fitzpatrick, the vice president of development and education policy for the Michigan Virtual University, which was established with help from the state in 1998 to meet workforce education needs. "But a couple of initiatives ... are changing that in a big way."

One new state program aims to provide the vast majority of Michigan teachers with both a laptop computer and an Internet connection by the coming school year. The $110 million effort is envisioned as far more than a way to make even crucial hardware standard across the state.

"We've put our stake in the ground with our laptop initiative, initially to get teachers comfortable with and savvy about computer use," says A. Scott Jenkins, the education aide to Gov. John Engler, a Republican.

VITAL STATISTICS

State Education Agency Web Site: www.mde.state.mi.us/

State Education Agency Technology Contact:
Mary Ann Chartrand
(517) 373-1806
ChartrandM@state.mi.us

Pre-K-12 Enrollment: 1.7 million

Percent Children in Poverty: 15.4

Percent Minority Students: 25.6

Student per Instructional Computer: 5.1

E-Rate Funding (through March 6, 2001): $189,876,482

(See "Notes on State Profiles.")

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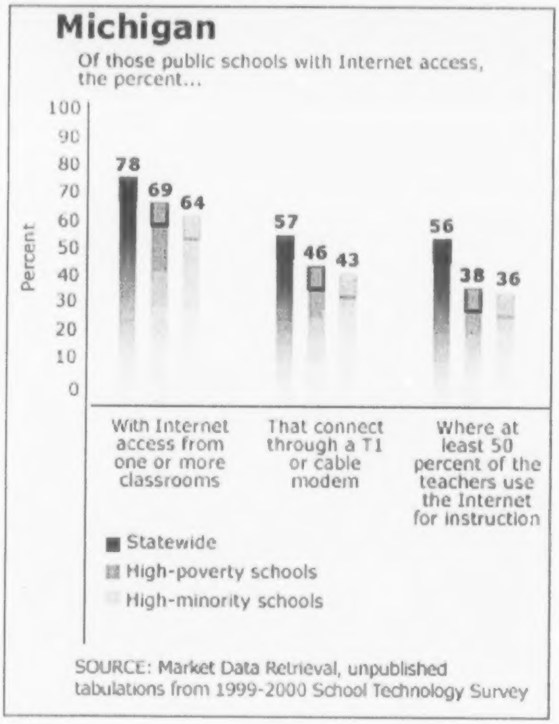

Michigan

Of those public schools with Internet access, the percent...

SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

The second phase of the project involves connecting teachers with one another and a host of online resources to help them integrate technology into the curriculum.

Teachers must pass an online assessment of their computer skills and file a plan for using technology before receiving a laptop. More than 60,000 teachers have applied, with poorer districts responding quickly to the offer, which state officials expect to extend eventually to 90,000 teachers.

"It's the small, rural districts and the large, urban ones that are coming to this opportunity with great speed," Fitzpatrick says.

Teachers receiving laptops will also be required to complete another online assessment in a year. Fitzpatrick expects the surveys to provide a "snapshot" of teachers' knowledge about technology, which can be used to make decisions about further professional development.

Among the online aids for teachers will be a "portal" created in cooperation with the state's major educational groups, through which teachers can find a variety of resources.

For students, the Michigan Virtual University recently launched a "virtual high school" offering online Advanced Placement courses. The effort is slated to expand in the coming school year to include college courses available to high school juniors and seniors, and courses and tutorials aimed at students at risk of failing to graduate. Plans call for students to be able to get tutoring for the state tests that qualify them for college scholarships.

A related program, also run by the virtual university, recently began making available free to students and teachers about 700 information-technology courses, from using word processing to running a World Wide Web site.

—Bess Keller

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Minnesota

As it does with other aspects of K-12 education, Minnesota sends money to districts and schools and lets them decide whether or not to spend it on educational technology.

The North Star State has no funding specifically earmarked at the state level for school hardware costs or technology-training programs for teachers.

It also has no particular state programs aimed at closing digital disparities between poor and rich schools. In fact, the state education agency is only now in the process of collecting information from schools on their technology needs in the form of three-year plans drafted by districts.

VITAL STATISTICS

State Education Agency Web Site: www.educ.state.mn.us/

State Education Agency Technology Contact:
Mary Mehsikomer
(651) 582-8827
mary.mehsikomer@state.mn.us

Pre-K-12 Enrollment: 847,000

Percent Children in Poverty: 15.4

Percent Minority Students: 16

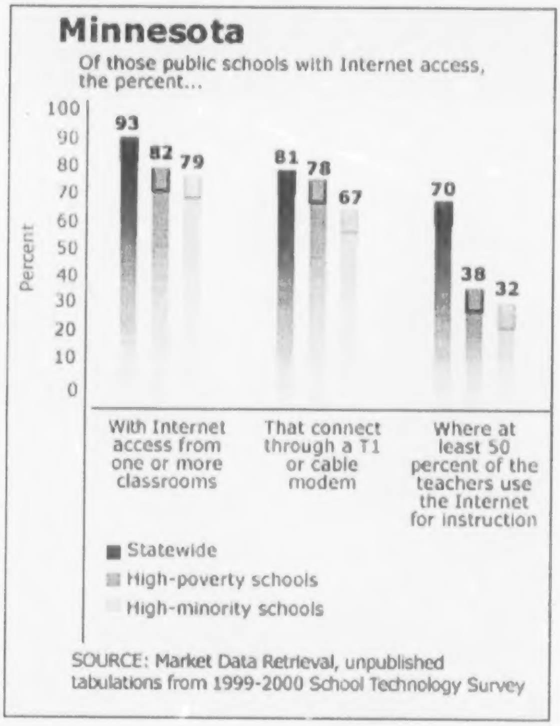
Student per Instructional Computer: 4.2

E-Rate Funding (through March 6, 2001): $71,379,562

(See "Notes on State Profiles.")

"We're essentially a local-control state, so the philosophy is to put funds in the hands of local communities and let them decide what their needs and priorities are," says Mary T. Mehsikomer, the senior project planner in the information-technology division at the Minnesota Department of Children, Families, and Learning.

But the state does have something called the telecommunications-access revenue program. Under the initiative, districts receive an extra $5 per student for ongoing telecommunications costs associated with video learning, data support, and the Internet. Any leftover money that a district receives under the program can be used to buy computers and related equipment.



SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

Any district with telecommunications needs that top the per-pupil allocation can apply for a grant under the program. The state set aside $18.5 million under the current two-year budget for the grants, but districts must first apply for other available funding such as federal E-rate money before they seek to tap the state's pool of grant money. "We have large disparities throughout the state in telecommunications costs, depending on where you are in the state and your access to telecommunications Mehsikomer says.

Steven J. Ullrich, the president of the Minnesota Technology Education Association, says his group is working to help Minnesota integrate national technology-literacy standards with curricula, and local colleges and universities are training teachers to use technology in the classroom. The state government, on the other hand, isn't doing enough, Ullrich contends.

"In Minnesota, we're having problems with funding," he says. "The [proposed] budgets we're looking at are calling for significant cuts. Any additional money is probably going to be aimed at shortfalls, and we have to get past that before there's any surplus to purchase technology."

—Darcia Harris Bowman

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Mississippi

Mississippi school districts, amid an economic slowdown and the threat of less money from the state legislature, are relying more on grants and partnerships to give students better access to technology.

The Classroom Technology Initiative, promoted by Gov. Ronnie Musgrove, a Democrat, and the state education department, will put an Internet-accessible computer in every classroom by the end of 2002. About 65 percent of Mississippi classrooms now have such access.

Six vendors, including Apple Computer Inc. and the Dell Computer Corp., are supplying 6,325 Internet-ready computers this spring at substantial discounts, along with educational software and four days of teacher training, at no cost to schools.

Next year, the same number of computers-at another $6.3 million, paid for with public and private money-will complete the plan, further reducing the current student-to-computer ratio of 7.6-to-1, according to state officials.

The computers are going first to classrooms that already have been wired for Internet access, and to teachers who have expressed a willingness to be trained in how to better incorporate technology into the curriculum.

VITAL STATISTICS

State Education Agency Web Site: www.mde.k12.ms.us/

State Education Agency Technology Contact:
Helen Soulé
(601) 359-3954
Hsoule@mde.k12.ms.us

Pre-K-12 Enrollment: 499,000

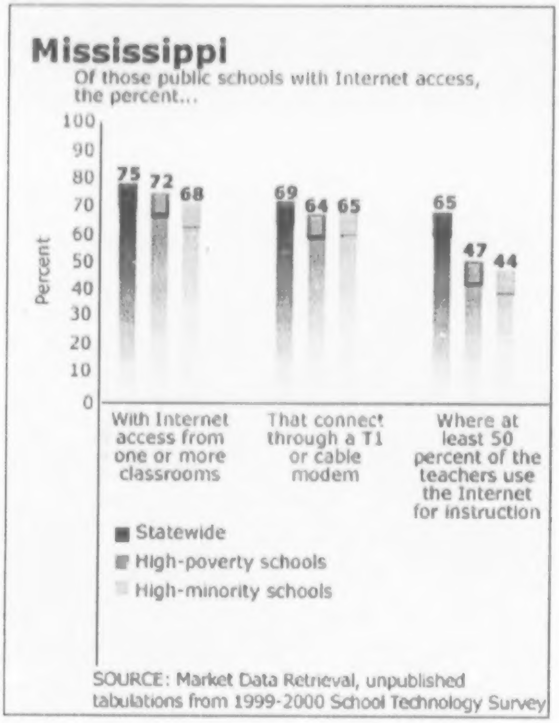
Percent Children in Poverty: 21.6

Percent Minority Students: 52.5

Student per Instructional Computer: 6.4

E-Rate Funding (through March 6, 2001): $84,996,489

(See "Notes on State Profiles.")



SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

Fifty of the state's 152 school districts, meanwhile, are getting computer labs stocked with up to 20 Gateway computers from Powerup, a national group whose mission is to bridge the digital divide. The labs, staffed with volunteers from the AmeriCorps service program, are being used in part for after-school programs and teacher training in some of Mississippi's poorest areas.

Those areas include districts that can't afford to put any computers in their classrooms. The project is being financed with a $1.4 million grant that pays for living allowances, health insurance, and educational stipends for the volunteers.

The only district to get more than one lab is the urban Columbus school district, which serves a dwindling, low-income population of about 5,200 students. Its superintendent asked for eight labs, but is happy with two.

Computers at both an elementary school and a high school there will mean unprecedented access to technology, district officials say. "It's really critical in this district, because 97 percent of the people are at the low-income or poverty level," says Lanell Kellum, who helped write the grant proposal. "It's going to be a real meaningful project."

The state spent $26 million on school technology for fiscal 2000, which began July 1, and allocated $29.8 million in fiscal 1999.

"I don't know if you'd say the budget's in a crisis, but it's pretty close," Helen Soulé, the director of the state's office of Educational Technology, Training and Support, says of the state's spending plan for education technology. "It's required us to look at technology to solve some of our problems."

For example, instead of traditional face-to-face workshops, districts are using more computer courses to train teachers, which is expected to save money in the long run.

—Robin L. Flanigan

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Missouri

Missouri's annual school technology survey shows a digital divide at the "real extremes," says Deborah Sutton, the director of instructional technology in the state department of education.

"We do acknowledge it in tiny districts-those with under 50 students-and in large urban districts like Kansas City and St. Louis, where the buildings are so old," Sutton says. But she adds that Missouri also has urban schools with "wonderful technology" and poor rural schools with high-speed Internet connections.

Missouri has worked to minimize technology gaps in a few ways, Sutton says. One is by subsidizing the statewide Missouri Research and Education Network, which provides schools with Internet access. In fiscal 2001, the state is giving the network $7.1 million of the $44 million it has dedicated to technology. Of Missouri's 524 school districts, 510 get Internet access through that network, with most using T1 lines, Sutton says.

The state has also stressed teacher training to close the divide. "If teachers see what technology can do, we think they can find additional money for technology" from grants, Sutton says. Since 1998, Missouri has required districts to spend 20 percent of their state technology dollars on professional development.

VITAL STATISTICS

State Education Agency Web Site:
services.dese.state.mo.us/

State Education Agency Technology Contact:
Deborah Sutton
(573) 751-8247
Dsutton@mail.dese.state.mo.us

Pre-K-12 Enrollment:897,000

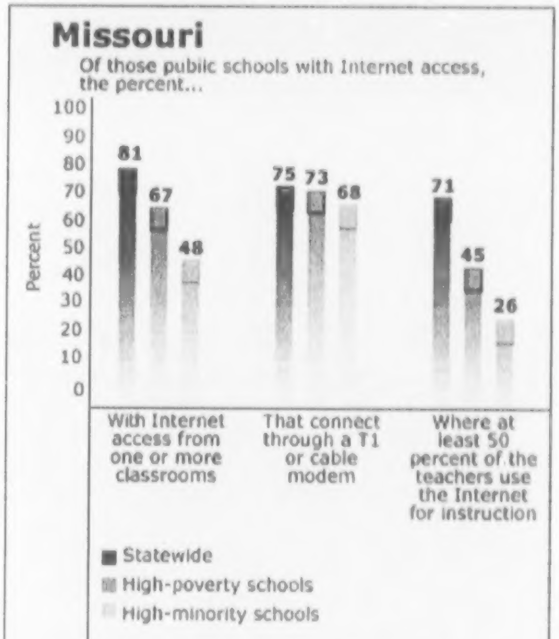
Percent Children in Poverty:15.6

Percent Minority Students:20.3

Student per Instructional Computer:4.5

E-Rate Funding (through March 6, 2001):$126,134,494

(See "Notes on State Profiles.")



SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

One specific initiative that educators say has helped advance the skills of teachers and students is eMINTS, for Enhancing Missouri's Instructional Networked Teaching Strategies, which began in 1997 in 12 classrooms with money from Southwestern Bell. The state picked up the program two years ago and now incorporates it in 200 classrooms.

In each of those classrooms, the state pays for a teacher laptop and a workstation with a smart board (a large, touch-sensitive display screen), a scanner, a color printer, and digital and video cameras. The district, in turn, must pay for teachers to receive 200 hours of technology training over three years. The district and the state share the cost of equipping classrooms with one computer for every two students.

Initially focused on poor schools, eMINTS is now open to any district that applies. But Sutton says an increase in applications may force the state to tighten selection criteria.

One district benefiting from the program is the rural Gideon schools. Although 65 percent of its 400 students qualify for free or reduced-price lunches, Gideon boasts 250 computers, most of which have Pentium II or III processors.

"When our students come to school, they have access that is better than or equal to anywhere else in the state," Superintendent David Hollingshead says.

--Jo Anna Natale

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Montana

Montana's school districts don't count on much help from their state in closing the digital divide. The Treasure State subsidizes no programs to equalize access to computers, no initiatives to ensure across-the-board classroom connections, and no efforts to upgrade teachers' technology skills.

"Curriculum, instruction, and textbooks are strictly local decisions," says Michael Hall, who oversees instructional technology in the state office for public instruction. Local districts get a share of state education dollars, and then they decide how and where to spend them.

Consequently, the technology that Montana's schools do offer students and teachers runs the gamut, reflecting local leadership, local budgets, and local luck in procuring federal grants.

"We have districts that have no computers or just Apple IIe's, and we have districts that have the best you can get," says Hall, whose own salary is paid for out of a federal Technology Literacy Challenge Fund grant. "We have tremendous people doing tremendous things, but they're doing them under a tremendous burden."

VITAL STATISTICS

State Education Agency Web Site:
www.metnet.state.mt.us/MAIN.html

State Education Agency Technology Contact:
Michael Hall
(406) 444-4422
mhall@state.mt.us

Pre-K-12 Enrollment:156,000

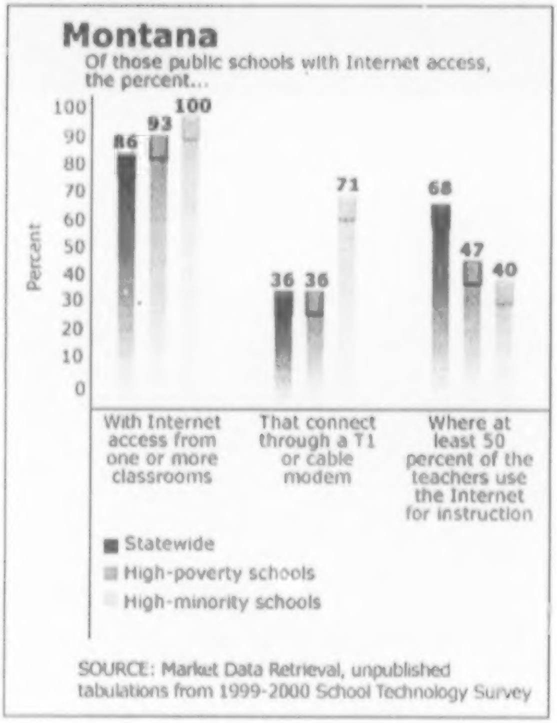
Percent Children in Poverty:22

Percent Minority Students:13.5

Student per Instructional Computer:3.1

E-Rate Funding (through March 6, 2001):$10,504,152

(See "Notes on State Profiles."**)**



SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

Montana sometimes gives its districts a small per-pupil sum for technology. But because the money comes from timber sales, the legislature allocates funding only when the harvest is good. Last year, districts received $9 per student; in fiscal 2001, $22 per student. The current amount, Hall says, is "really amazing-something no one ever expected"-but it offers meager help in a state where 100 of the 460 districts claim fewer than 25 students.

Even though Montana earmarks little state aid for technology, it requires local districts to incorporate technology and technology standards into instruction. The broad standards, approved by the state board of education in 1999, set down what students should know and be able to do at three points in their schooling: 4th grade, 8th grade, and upon high school graduation.

How well districts are prepared to do that, given the state of their equipment and professional skills, is something the Montana Office of Public Instruction is poised to find out. In conjunction with the Montana State Library Association and the Montana Small Schools Alliance, the office is now surveying every district to get information about hardware, connections to the Internet, and teacher and student expertise with technology. Federal money is paying for the effort, Hall says.

"It'll be the first truly comprehensive survey, and the first time we've undertaken one ourselves," Hall says. While market-research companies have surveyed Montana districts, none of those studies has given the state a full picture of its situation.

The district-by-district information is expected by late spring. "The goal is to give districts the data so they can compare themselves to districts of similar size" and pursue federal grants, Hall says.

--Jo Anna Natale

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Nebraska

Education officials in the Cornhusker State are focusing their efforts to address the digital divide on sparsely populated districts-some of which still have schools that connect to the Internet via party lines.

Federal money provided through Technology Literacy Challenge Fund grants have helped the state address inequities in its metropolitan areas, "but we still have to do it in rural areas," says Dean Bergman, the director of education technology for the state education department. "We're still trying to get to them.

"We have schools in isolated areas that can't offer the bandwidth or programs that they can in more populated, well-to-do districts," he adds.

VITAL STATISTICS

State Education Agency Web Site: www.nde.state.ne.us

State Education Agency Technology Contact:
Dean Bergman
(402) 471-5023
dbergman@nde.state.ne.us

Pre-K-12 Enrollment: 286,000

Percent Children in Poverty: 16.2

Percent Minority Students: 14

Student per Instructional Computer: 3.7

E-Rate Funding (through March 6, 2001): $17,700,913

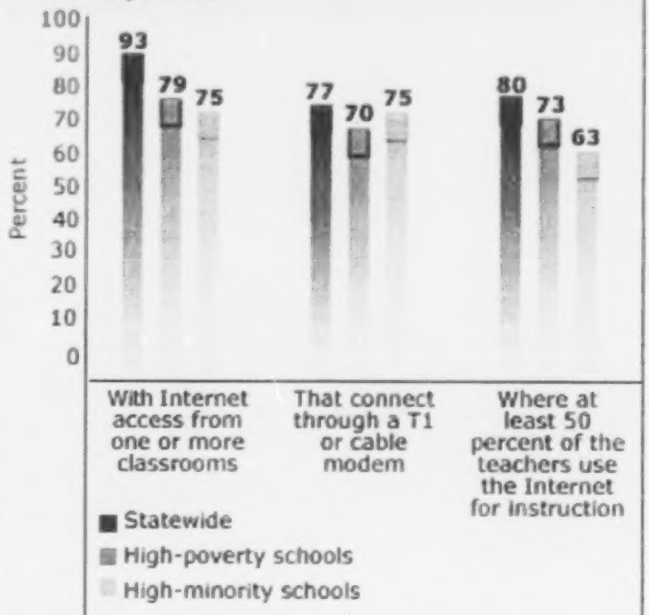
(See "Notes on State Profiles.")

Just how much state government can do, though, is limited in Nebraska, a state that takes pride in local control.

For example, although the state provides "highly recommended" guidelines for what students and teachers should know about technology, local districts' adherence to the guidelines is voluntary, Bergman says. The state is in the process of drafting similar guidelines for administrators.

Nebraska

Of those public schools with Internet access, the percent...



SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

Since 1991, the state has furnished some money for technology acquisition, Internet connections, and teacher training, giving preference to poorer districts and those in sparsely populated areas. In fiscal 2001, state funding for technology from a combination of sources, including lottery proceeds, amounts to about $12 million.

Districts can also draw from a special $13 million fund originally set up to lend districts money to make school buildings more energy-efficient. As districts pay back the loans, the money goes toward reimbursing other districts for costs associated with connecting schools and classrooms to the Internet.

The problem is that getting reimbursed for expenditures can take years.

"We spent $130,000 three or four years ago, and we haven't seen [reimbursement] yet," says Sue Burch, the director of technology in the largely rural Grand Island public schools.

As a consequence, Burch says, she had to outfit a new elementary school with 3-year-old computers borrowed from a training lab because her 7,000-student district couldn't afford new equipment.

Bergman acknowledges that some districts "do wait a long time to get their grants." He adds that the money is distributed on a first-come, first-served basis, to the tune of about $900,000 a year.

In infrastructure, Nebraska has made strides in recent years. The state has a 5.1-to-1 ratio of students per Internet-connected computer, compared with 7.2-to-1 a year ago. In high-poverty schools, the ratio is just 3.9-to-1, well below the national average of 10.4-to-1.

—Jo Anna Natale

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Nevada

In 1998, Nevada's Commission on Educational Technology drafted a five-year, $64 million plan to integrate technology into schools' curricula. But the Silver State is still concentrating on one of the plan's more basic goals: making sure that all Nevada schoolchildren have access to computers and the Internet. The state has made significant progress in that regard. In 1998, only 61 percent of its schools were connected to the Internet, but as of this year, 99 percent of the schools are linked to the global computer network, according to Moises Denis, the chairman of the commission. The group still hopes to reach its goal of a networkable computer in every classroom; currently, 76 percent of the state's classrooms can make that claim.

Major challenges, Denis says, include keeping up with fast-growing Clark County, which includes Las Vegas, and ensuring that Nevada's most remote areas have adequate electrical circuitry and high-speed lines to sustain Internet computers.

The legislature, which meets every other year, appropriated $36 million for technology in the 1997-99 biennium, anticipating heavy costs for equipment and installation, Denis says. But funding dropped to $4.2 million for the 1999-2001 biennium. All districts applied for and received money, with higher per-student amounts going to poorer districts and those with greater technology needs.

VITAL STATISTICS

State Education Agency Web Site:
www.nde.state.nv.us/

State Education Agency Technology Contact:
Mark Knudson
(775) 687-9137
mark@nsn.k12.nv.us

Pre-K-12 Enrollment:341,000

Percent Children in Poverty:13.7

Percent Minority Students:41.1

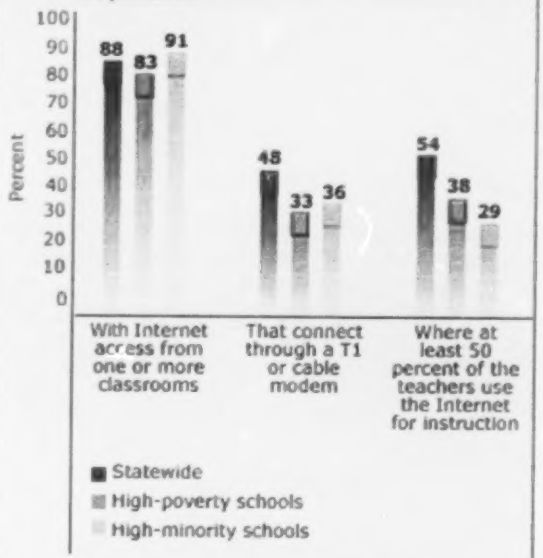
Student per Instructional Computer:6.1

E-Rate Funding (through March 6, 2001):$12,558,792

(See "Notes on State Profiles.")

Nevada

Of those public schools with Internet access, the percent...



SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

Denis says the commission hopes to broaden its focus to teacher professional development in the next two years. Currently, the state does not require technology training for teachers, but officials are discussing the idea, says Doug Thunder, who as Nevada's deputy superintendent for administrative and fiscal services oversees technology issues in the state's 17 districts. "It does worry us that our teachers aren't required to have this training," Denis says. "What good are all these computers going to do if they don't know how to use them?"

New academic standards in technology, put in place this year for the first time, are designed to ensure that Nevada students learn about and use computers. But the state does not test them on that knowledge, and Thunder says such tests "are not on the front burner" of discussion.

The state surveys its schools and districts yearly about the state of their technology and training. It does not ask questions, though, that might reveal whether poor or minority students have less access than other students to computers or use computers differently, Denis says.

"That's something important to find out, and we don't have that information," he says.

--Catherine Gewertz

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New Hampshire

New Hampshire's efforts to close the digital divide are limited to getting basic hardware into as many schools as possible.

"We just don't have the funding to go too far beyond that," says Cathy Higgins, an educational technology consultant for the state education department.

The $2 million in education technology grants that were distributed to Granite State schools this school year came entirely from federal sources. The state provides no money of its own to help schools connect to the Internet or buy new equipment.

In doling out the grants from the federal Technology Literacy Challenge Fund, the state gives more weight to requests from poorer schools or those with greater technology needs. But it's hard to tell from the state's own annual surveys how much of a divide remains between New Hampshire schools.

The gap is probably large, says Steven Rothenberg, the educational technology consultant for the Concord public schools, in the state capital, because the state until recently relied heavily on local property taxes to operate its schools.

VITAL STATISTICS

State Education Agency Web Site:
www.state.nh.us/doe/

State Education Agency Technology Contact:
Cathy Higgins
(603) 271-2453
chiggins@ed.state.nh.us

Pre-K-12 Enrollment:210,000

Percent Children in Poverty:14.3

Percent Minority Students:4.1

Student per Instructional Computer:6.1

E-Rate Funding (through March 6, 2001):$4,129,859

(See "Notes on State Profiles."**)**

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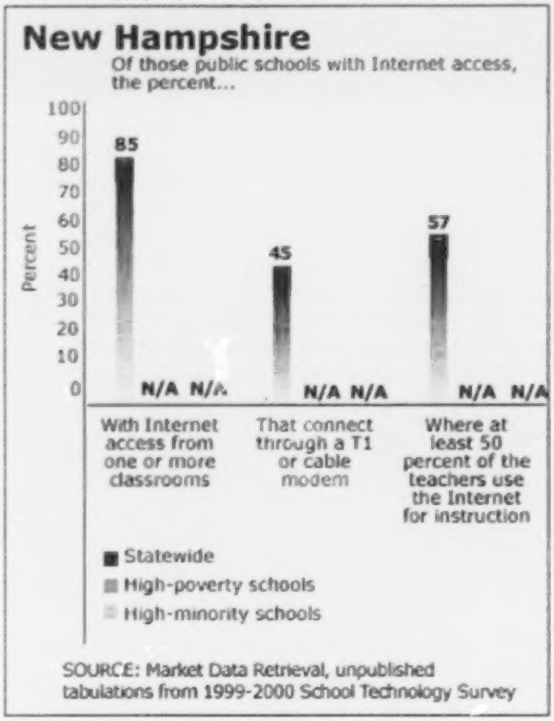
"If a town is property-rich, it probably has a lot of resources for its schools," Rothenberg says. "If it's not, then resources may be thinner, and that scenario plays itself out with technology."



SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

What the data do show is that New Hampshire is making steady progress overall in increasing the numbers of schools and classrooms with modern computers, Internet access, and high-speed Internet connections. By November 1999, for example, 60 percent of schools had met the state's goal of having at least one modern computer in 80 percent of their classrooms. That figure marked a 20 percent increase over the previous year.

As of last year, fewer than 3 percent of schools still had no Internet-linked computers.

Still, the state's surveys show that fewer than one-fifth of its schools regularly use that equipment for sophisticated collaborative or project-based activities.

New teacher-certification requirements proposed for use this year are intended to help ensure that all the state's new teachers will have the preparation they need to go beyond student drill-and-practice activities with the computers in their classrooms. For other teachers, the state has stocked a Web site with lesson plans that effectively incorporate learning technology.

--Debra Viadero

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New Jersey

In order to give all students an equal shot at meeting state academic standards, New Jersey officials say they are working on several fronts to bridge the digital divide.

Under a landmark 1998 ruling in the state's Abbott v. Burke finance-equity case, more than 430 schools in 30 of New Jersey's poorest districts were required by the current school year to adopt schoolwide approaches for improving education. Schools that are putting such programs in place are eligible to share more than $350 million in annual state supplemental funds so that they can access the same quality technology programs as their wealthier counterparts.

In addition, the Educational Technology and Whole School Reform Program, a $1.23 million state grant program underwritten by the federal Technology Literacy Challenge Fund, provides technology intended to help the state's poorest schools carry out their chosen reform plans. Staff members from those schools work with employeesfrom the state's Educational Technology Training Centers, along with developers of their whole- school reform models, to determine the most effective ways for schools to use technology.

The technology-training centers--one in each of New Jersey's 21 counties--were established in the late 1990s, largely with federal Goals 2000 aid. So far, they have provided technology-related professional development or other help to more than 100,000 teachers and administrators. Poor districts receive priority in training and in access to the centers' resources, says Julia Stapleton, New Jersey's education technology coordinator.

VITAL STATISTICS

State Education Agency Web Site:
www.state.nj.us/education/

State Education Agency Technology Contact:
Julia Stapleton
(609) 984-1644
Julia.Stapleton@doe.state.nj.us

Pre-K-12 Enrollment:1.3 million

Percent Children in Poverty:12

Percent Minority Students:39.2

Student per Instructional Computer:4.6

E-Rate Funding (through March 6, 2001):$148,619,228

(See "Notes on State Profiles.")

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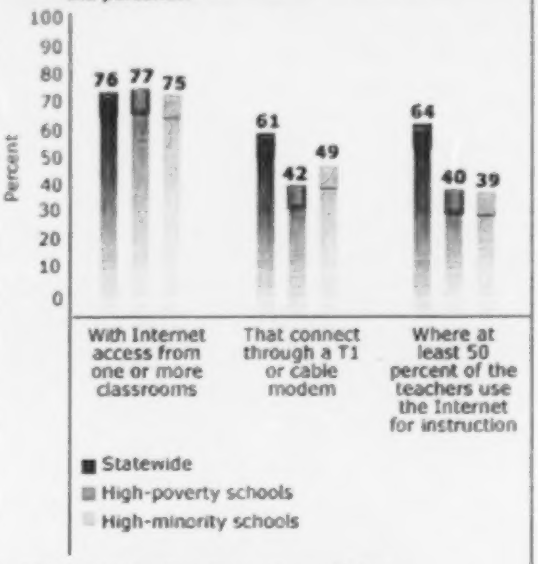
New Jersey
Of those public schools with Internet access, the percent...



SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

For fiscal 2000-01, the state budget included roughly $60 million for technology in public schools and $8 million for private school technology. Those funds are distributed as entitlements through the state's Distance Learning Network Aid, a five-year program that began during the 1997-98 school year.

The distance learning program helps supply schools with multiple high-speed voice, video, and data services to connect to one another, and to libraries, colleges, and government agencies.

New Jersey runs several competitive-grant programs related to technology that tap money from federal sources such as the Technology Literacy Challenge Fund, Goals 2000, and the Individuals with Disabilities Education Act.

The Assistive Technology for Students with Disabilities Training Project, for example, is a federally financed $600,000 state grant program established to ease access to technology for students with disabilities, as well as to train teachers and administrators to help those students with technology.

Another initiative, the Pairing and Sharing grant program, paid for with $7 million from Goals 2000 and Technology Literacy Challenge Fund, pairs off school districts--one must be economically disadvantaged--so they can share instructional programs using telecommunications with real-time, live interaction.

The Access Collaboration and Equity program, financed with $7.5 million in Goals 2000 and Technology Literacy Challenge Fund money, builds community-based learning and technology centers in poor New Jersey districts.

Every school in the state, meanwhile, has an approved, long-range technology plan; 98 percent of the state's schools and 72 percent of its classrooms have access to the Internet, 80 percent of New Jersey schools have their own Web sites, and 83 percent of the state's teachers have e-mail addresses.

That information was gleaned from the second-ever education department survey of schools conducted in spring 2000. More than 80 percent of New Jersey's public schools responded. Data collected from this year's technology survey will be on the department's Web site this May.

--Kerry A. White

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New Mexico

School technology experts in New Mexico are now at a point where they talk more about how students can use computers in their learning than about whether they have computers.

Since 1994, when the legislature passed the Technology for Education Act, 85 percent of the state's classrooms have been connected to the Internet. New Mexico now has an average of one Internet-linked computer for every six students, says Steven A. Sanchez, the state director of educational technology.

"We're moving beyond infrastructure and are now more focused on how technology enhances the teaching and learning process," he says.

As the state's academic standards undergo a cyclical revision, technology is being embedded in each one, says Sanchez, so students will incorporate it into their work across all disciplines.

New Mexico has also established a "virtual school" that offers Advanced Placement and other classes, an addition that is especially valuable for students in poor and remote areas who otherwise wouldn't have access to the courses, he says.

VITAL STATISTICS

State Education Agency Web Site:
www.sde.state.nm.us/

State Education Agency Technology Contact:
Steven Sanchez
(505) 827-3644
ssanchez@sde.state.nm.us

Pre-K-12 Enrollment: 317,000

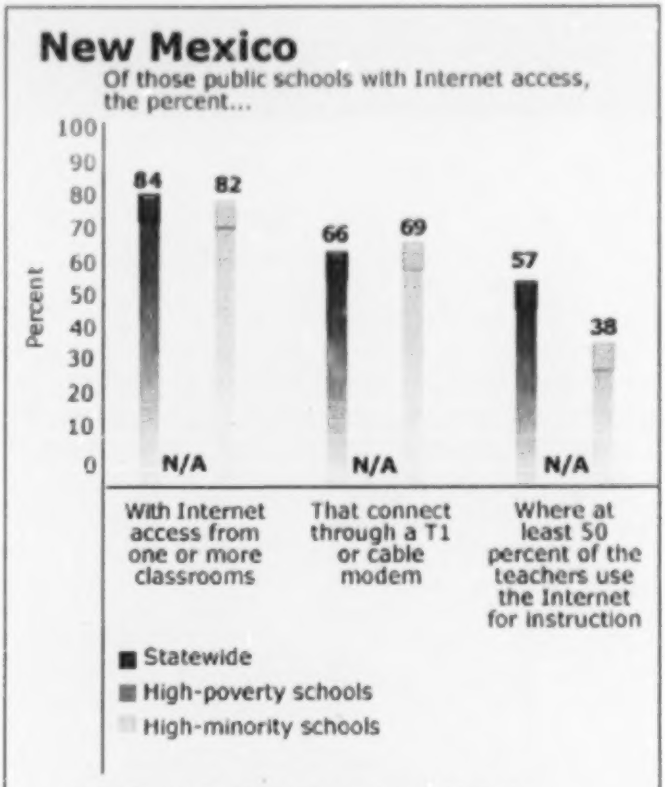
Percent Children in Poverty: 26

Percent Minority Students: 63.8

Student per Instructional Computer: 4.9

E-Rate Funding (through March 6, 2001): $67,077,541

(See "Notes on State Profiles.")



SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

The state recently made an important change in the way it pays for school technology. The Technology for Education Act originally distributed the money to districts on a per-student basis, but that meant that smaller districts got as little as $800, Sanchez points out.

The change, implemented this year, calculates each district's allocation based on a percentage of what the legislature appropriated to the technology fund that year. Based on the $5 million appropriation this year—an amount that has grown steadily since 1995, when $3 million was earmarked—the new formula guarantees each district at least $3,750. Larger districts then get additional funding on a per-student basis.

New Mexico is pushing hard to make sure its teachers have the skills required to infuse technology into curricula in all 89 districts, says Carmen L. Gonzales, a professor of learning technologies at New Mexico State University, the project director for one of the state's professional-development programs, and a member of the Council on Technology in Education, a 17-member advisory body appointed by the state board of education. While the state allotted $9 million last year for educators' professional development, including in technology, New Mexico also relies heavily on federal programs for the technology itself and the training to use it. The state is giving low-income and low-performing schools the highest priority for teacher training in an attempt to address the digital divide, Gonzales says. Such training, given to teachers with an average of seven years on the job, is reviving teachers who have begun to feel "burned out," she says.

"They get into this and see a whole new way to engage students," Gonzales explains. "They're turned on once again to teaching."

—Catherine Gewertz

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New York

Big and diverse, New York state boasts districts that can serve as national models for the use of technology and those that are woefully below the norm.

State efforts are helping to smooth out some of the differences, which in general favor well-to-do districts, but observers say there is neither the push from the top nor the manpower within state government to make all districts effective users of technology.

A study commissioned by Gov. George E. Pataki three years ago concluded that $1 billion over four years spent on school technology would start to move New York to the front of the pack. This fiscal year, officials estimate that the state is spending about $100 million of its more than $13 billion school budget on technology- related expenses. Not only is that far less than the report called for, but local districts also continue to pick up the tab for more than 60 percent of all education costs.

"There's little leadership to make sure New York schools are adequately funded and led in the integration of technology," contends Thomas Beaudoin, the manager of educational services for New York State United Teachers, the state's largest teachers' union.

VITAL STATISTICS

State Education Agency Web Site:
www.nysed.gov/

State Education Agency Technology Contact:
Teh-yuan Wan
(518) 486-5832
twan@mail.nysed.gov

Pre-K-12 Enrollment:2.9 million

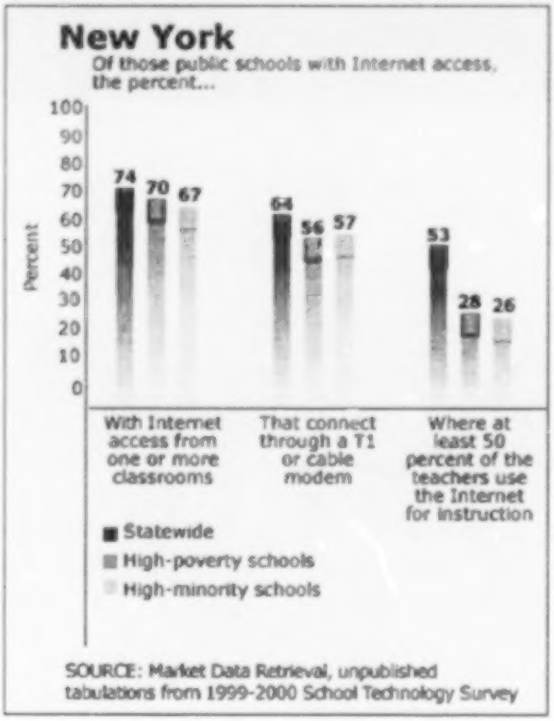
Percent Children in Poverty:24.2

Percent Minority Students:44.8

Student per Instructional Computer:5.3

E-Rate Funding (through March 6, 2001):$630,294,822

(See "Notes on State Profiles."**)**



SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

Still, everyone agrees the schools are better off because of the state's technology programs, some of which received significantly more funding this year, and some of which are weighted toward low-wealth, high-needs districts.

For example, the legislature earmarked $53 million for partial reimbursements on the cost of new spending on technology, mostly hardware, by the state's five largest urban districts.

Support for the state's 15-year-old teacher-resource centers--which provide an important source of after- school and weekend technology training for teachers--grew to $30 million last year, a $10 million increase.

In-school help for teachers striving to expand their repertoires of technology use continues to be provided by a "model schools" program run through the state's regional educational service centers.

New York's lowest-performing schools, the bulk of them in New York City, get help from special support- service centers, whose purview includes technology use. State officials hope that, with help from the Bill and Melinda Gates Foundation, the service centers will soon also include a technology- rich leadership program that will reach most principals and superintendents in the state.

Teh-yuan Wan, the state's educational technology coordinator, also credits federal Technology Literacy Challenge Fund money for helping to narrow the digital divide. Under New York's version of the program, he says, the state has put teachers' best lessons and activities on the Internet.

That's of particular help to high-needs schools, he points out, because they "tend to lack quality educational content, ... not the hardware."

--Bess Keller

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North Carolina

In an effort to fulfill former Gov. James B. Hunt Jr.'s goal of having North Carolina schools "first in the nation" by 2010, North Carolina lawmakers recently began addressing how the digital divide hinders progress.

The state's K-12 Computer Skills/Technology Skills Standard Course of Study, unveiled in 1998, lays out what students in each grade are supposed to know about computers and be able to do with them.

That year, each school district was required to submit a four-year plan to the state that was consistent with those standards and a host of other state technology standards--requirements for technology use in classrooms, media centers, technology labs, and administrative offices. Within those plans, which are to be updated next year, districts are expected to address issues related to the digital divide, according to Wynn Smith, a technology specialist for the state education department.

An exam administered to 8th graders--the North Carolina Tests of Computer Skills--measures proficiency in keyboard use, word processing, database use, and spreadsheet use. And beginning with this year's graduating class, students are required to have passed the test to receive a high school diploma. The state requires that schools help students who have failed the test until they pass it.

VITAL STATISTICS

State Education Agency Web Site:
www.dpi.state.nc.us/

State Education Agency Technology Contact:
Frances Bryant Bradburn
(919) 807-3292
FBRADBUR@dpi.state.nc.us

Pre-K-12 Enrollment: 1.3 million

Percent Children in Poverty: 21.3

Percent Minority Students: 38.2

Student per Instructional Computer: 5.2

E-Rate Funding (through March 6, 2001): $90,977,242

(See "Notes on State Profiles.")

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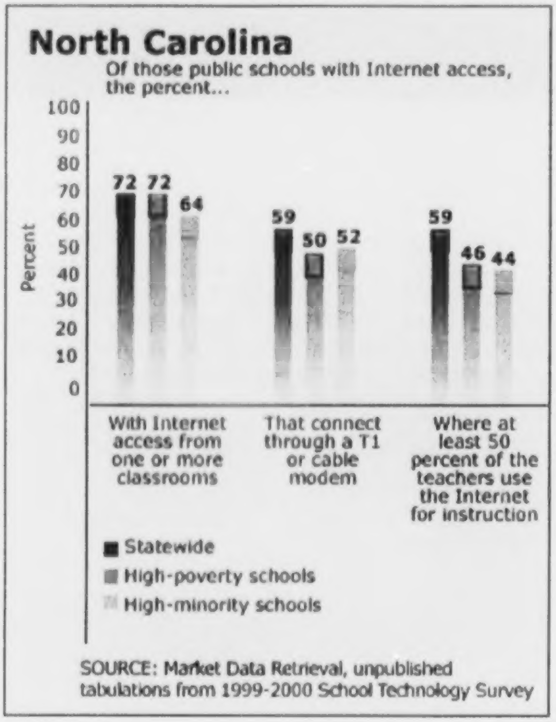

SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

Currently, the state pays for technology primarily through the School Technology Trust Fund, an interest-bearing account that receives appropriations from the legislature. Although the education department had originally requested $342 million over five years, beginning in 1995, only $122 million has been set aside for the fund so far.

Other state technology programs include N.C. Wise, a five- year, $50 million information-management system that gives teachers and administrators access to students' testing records and instructional resources, and helps them manage portfolios of student work. N.C. Wise Owl, a similar service that is paid for through the state's federal Technology Literacy Challenge Fund grant, gives students access to a host of online resources--newspapers, encyclopedias, periodicals--from their school and home computers.

And recent proposals, though not expressly intended to address the digital divide, could help to bring new help to students and schools that have fallen behind technologically.

Pointing to stubborn performance disparities between African-Americans, Hispanics, and Native Americans, on the one hand, and white and Asian- American students on the other, state schools Superintendent Michael E. Ward announced a 10-point plan last year for addressing that achievement gap. Among other provisions, the plan calls for helping poor and low-performing schools and ensuring that more students have access to high-quality technology and instruction.

A two-year, $60 million plan introduced in the state House of Representatives this spring would pay for a technology facilitator in each of the state's low-performing schools and in schools where students take the state's computer-skills proficiency exams.

--Kerry A. White

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North Dakota

By August, North Dakota hopes to have all its K-12 school districts and state and county government offices connected to one another and to the Internet by a T1 line.

The legislature mandated the creation of the statewide network in 1999 and allocated $17 million over two years to complete it. The network will go to all the state's high school buildings; it's up to districts to figure out how to pay for "the last mile" to connect middle school and elementary school buildings. One-school districts, however, are not unusual in the sparsely populated state, says Christopher Kalash, the state's administrator of the federal Technology Literacy Challenge Fund program.

The network should make a real difference in what schools are able to offer by expanding their capacity for distance education via video, Kalash says.

"This is very significant, especially for the most rural districts," he says.

North Dakota has had an interactive-television network since the late 1980s, but participating districts, not the state, have been the primary supporters, Kalash says. Now the hope is to leverage the network to offer distance education courses anywhere in the state-a change that would help narrow the digital divide between larger districts that can offer a comprehensive curriculum laden with electives and smaller rural districts that cannot.

VITAL STATISTICS

State Education Agency Web Site:
www.dpi.state.nd.us/index.shtm

State Education Agency Technology Contact:
Christopher Kalash
(701) 328-2273
ckalash@mail.dpi.state.nd.us

Pre-K-12 Enrollment:106,000

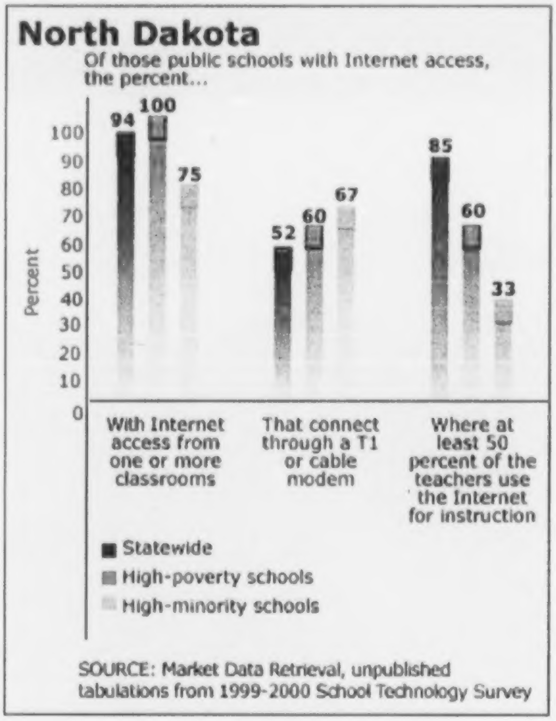
Percent Children in Poverty:20.6

Percent Minority Students:10.6

Student per Instructional Computer:3.6

E-Rate Funding (through March 6, 2001):$6,481,474

(See "Notes on State Profiles.")



SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

"If a district is lucky enough to have a Spanish teacher in a school with 300 students, they'll be broadcasting [classes] to many places now," Kalash says.

The state also has supported online expansion of its independent-study program, which includes a fully accredited high school curriculum that allows students to earn diplomas entirely through distance learning. This year, the state has made available on the Internet about 50 of the 200 independent-study courses.

For the past several years, the Peace Garden State has allocated about $6 million per biennium for districts to spend on school technology, says Kalash, who describes North Dakota as a "hard-core local control" state. The dollars are distributed based on enrollment and poverty level.

Beginning this coming fall, teacher-candidates in North Dakota's schools of education will have to earn at least one college credit in instructional technology to graduate.

Meanwhile, the Center for Innovation in Instruction, housed at North Dakota's Valley City State University, offers professional development in technology for current teachers and administrators. Dan Pullen, the center's director, says the center helps narrow the digital divide by working primarily with smaller, more isolated districts.

"We don't deliver a lot of direct services to the very large school districts because they usually have staff of their own," Pullen says of the center, which receives some state money. "Small and rural schools can easily fall behind."

--Lynn Schnaiberg

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Ohio

Ohio started spending on school technology in earnest in 1995, and so far it has funneled some $856 million to schools. At the center of those efforts are two programs, Ohio SchoolNet and School NetPlus. SchoolNet, a five-year program completed last December, wired every public school classroom in the state to a high-speed network that can support telephone, Internet, and video transmissions. It also delivered one computer per grade--a total of more than 15,000 computers--to the state's poorest schools.

SchoolNet Plus was designed to bring about a 5-1 ratio of students to multimedia computers in kindergarten though 5th grade by this coming fall, with poor districts receiving a higher per-student allocation of funding than wealthier districts. Districts that have already met that ratio can use the state money to buy computers or related services, such as teacher professional development, for grades 6-12.

The state's next step, SchoolNet Plus care, which stands for "continued acquisition and repair of equipment," is to carry out the computer program beyond the 5th grade.

"There are still a lot of gaps in grades 6 to 10 in particular" in infrastructure and multimedia computers, says Sam Orth, the executive director of the Ohio SchoolNet Commission.

VITAL STATISTICS

State Education Agency Web Site:
www.ode.state.oh.us/

State Education Agency Technology Contact:
Sam Orth
(614) 728-8324
orth@osn.state.oh.us

Pre-K-12 Enrollment: 1.8 million

Percent Children in Poverty: 17.9

Percent Minority Students: 18.9

Student per Instructional Computer: 4.4

E-Rate Funding (through March 6, 2001): $160,921,145

(See "Notes on State Profiles.")

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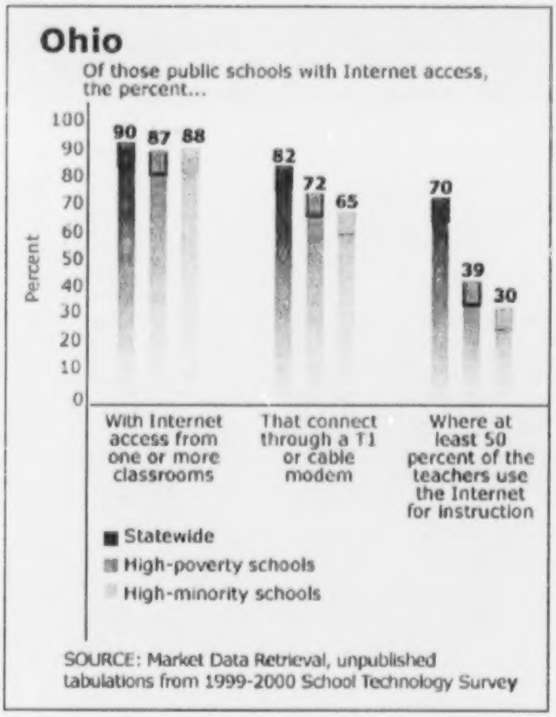

Ohio

Of those public schools with Internet access, the percent...

SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

The commission has requested $118 million over fiscal 2002 and 2003 to extend the 5-1 ratio to grades 6 and 7. But that proposal and several others concerning technology are at risk of not being funded in the 2002-03 biennium, Orth says, because they are not included in the budget proposed by Republican Gov. Bob Taft. The legislature is expected to approve a budget by early June.

If the programs do not receive funding, poor districts could be hit especially hard, Orth says, since many rely on state and federal dollars for their entire technology budgets.

One program that focuses specifically on poor districts is included in the governor's proposed 2002-03 budget. In fiscal 2001, the current budget year, the state distributed $3.3 million to 164 of Ohio's poorest districts in the form of technology equity grants, which districts can use for anything in their technology plans.

"This program has kind of filled in the gaps for poor districts" with technology needs not addressed by SchoolNet or SchoolNet Plus, Orth says.

The state also gives teacher technology- training grants to every district, based on enrollment. This year, the grants total $4 million.

And the state has put together a voluntary certification program for teachers that aligns curriculum, instruction, and technology and trains teachers in such skills as the use of spreadsheets and networks, multimedia applications, and ways to find the most relevant content. So far, about 40,000 teachers have received "novice" certificates; more than 1,600 have received "practitioner" certificates; and more than 2,500 have become "novice trainers."

--Lynn Schnaiberg

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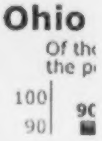

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Oklahoma

Oklahoma's attempts to close the digital divide have been hampered over the past two years by major road construction and other costly projects that state officials say have commanded the lion's share of state spending.

Last year, after reserving no discretionary money for school technology, the legislature set up a revolving Common Education Technology Fund to help absorb the loss. But the resulting $46 million was used instead to pay for teacher salaries.

"I know there are members of the legislature who really care," says Phil Applegate, the state's executive director for instructional technology and telecommunications. "But when it comes to the end of the year, with limited dollars to spend and a number of responsibilities to meet, you have to put out the fires before you can do anything to move forward."

Administrators are backing a proposed bill that, if approved, would guarantee schools at least half the technology fund's earnings. The state's 544 districts likely would apply for grants to spend the money, which is generated by taxes on oil and gas production.

VITAL STATISTICS

State Education Agency Web Site: sde.state.ok.us/

State Education Agency Technology Contact:
Phillip Applegate
(405) 521-3994
phil_applegate@mail.sde.state.ok.us

Pre-K-12 Enrollment: 626,000

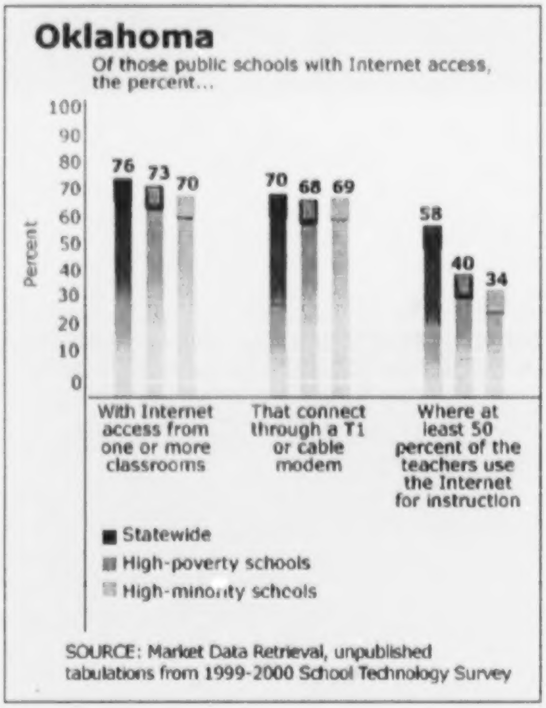
Percent Children in Poverty: 19.3

Percent Minority Students: 33.8

Student per Instructional Computer: 4.6

E-Rate Funding (through March 6, 2001): $91,977,358

(See "Notes on State Profiles.")



Oklahoma

Of those public schools with Internet access, the percent...

SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

State education officials say that 80 percent of Oklahoma elementary school pupils, 81 percent of middle school students, and 84 percent of high school students have Internet access in their classrooms. But the overall 6-1 ratio of students to computers that run at a speed deemed acceptable for education has more to do with federal discounts than state help, according to state schools Superintendent Sandy Garrett.

And while the numbers look good on paper, Applegate says those figures are "moving targets" because computers become obsolete in about 36 months. In addition, disparities between the wealthiest and the poorest districts can be wide.

In some poor districts, classrooms contain only one computer for every dozen or so students, while districts with more money sometimes see just a few students sharing a terminal.

This year's $32 million budget request for educational technology focuses on getting more computers into the neediest classrooms.

The state education department, meanwhile, received $500,000 last year to launch an ambitious program to teach courses throughout Oklahoma using the Internet.

Called the Virtual Internet School in Oklahoma Network, or vision, the pilot project partners nine school districts with such technology heavyweights as Dell, Intel, and Microsoft. Students in the 4th and 7th grades are the first to take online algebra and other math classes. More subjects and more schools will sign on if the project is successful.

Meanwhile, the state still is awarding districts distance-learning grants from $8.2 million set aside in fiscal 1999. The 166 grants, each worth $50,000, are particularly helpful for small districts that have been unable to hire teachers in all subjects.

And the number of schools connected to OneNet—the state's official telecommunications network used for accessing the Internet and videoconferencing—continues to climb. Sixty-seven percent can boast of a connection, up from 42 percent two years ago.

—Robin L. Flanigan

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Oregon

Oregon school districts are reaping the benefits of a bill passed by the legislature in 1999 that set up a $50 million school technology fund financed by the state's telecommunications vendors. State leaders say the measure has gone a long way toward closing the digital divide, though much work remains to be done.

All Oregon schools will be wired to the Internet via T1 lines by December of this year, says David Rike, the state's technology director. Each public school in the state received $5,400 to put in its first line (some schools had no lines at all prior to the legislation), upgrade its line to T1, or reimburse the cost of an existing T1 line.

"One of the aims of the legislation was to push the infrastructure out into the rural areas," Rike says. "Some schools that never would have had a line in the rural areas got the line because of this legislation."

In 2000 and 2001, close to $25 million has been made available to districts to spend on virtually any technology expense that will help them get connected to the Internet, from salaries for technology support staff to wiring and electrical power. Districts receive a minimum of $25,000; larger districts receive more.

VITAL STATISTICS

State Education Agency Web Site:
www.ode.state.or.us/

State Education Agency Technology Contact:
David Rike
(503) 378-3600, ext. 4494
david.rike@state.or.us

Pre-K-12 Enrollment:547,000

Percent Children in Poverty:21.6

Percent Minority Students:18.1

Student per Instructional Computer:5.2

E-Rate Funding (through March 6, 2001):$30,999,823

(See "Notes on State Profiles."**)**

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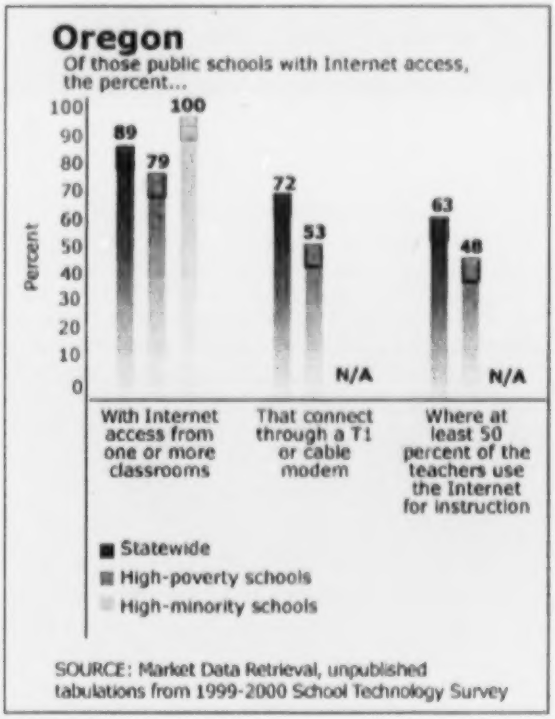

SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

The legislation also helped the 91 schools that did not have a local- area network at the time connect their libraries, administrative offices, and at least two classrooms. Most of the state's 1,200 schools already had been networked through local, grassroots efforts, Rike says.

Finally, the measure aims to bring distance education through two-way interactive video to all of the state's 284 high schools. But, Rike notes, there's no money budgeted to create a well-thought-out array of courses for high schools to use with their new equipment.

Despite the recent improvements, the number and quality of computers that schools have in their classrooms vary widely, depending largely on local initiative, he says.

"The [state education] department didn't really have a leadership role until recently," Rike says. "A lot of it was done at the grassroots level."

One group that has helped fill some of the void is the Oregon Public Education Network, which was created in 1995 by the state's 21 education service districts to help schools acquire technology and train teachers, among other purposes. That group receives some state money, but is financed mostly by the service districts, local districts, and business partners.

--Lynn Schnaiberg

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Pennsylvania

Pennsylvania officials see the digital divide in part as a leadership divide.

Over four years starting in 1996, the state's Link-to-Learn program brought about $200 million to Pennsylvania's 500 school districts, particularly rural and poor districts, to help schools introduce or expand technology infrastructure. Today, every district has a high-speed connection to the Internet, as do 92 percent of schools and 70 percent of classrooms, says John Bailey, the technology director for the state education department.

But Bailey says that how well districts and schools actually use technology to improve instruction or administration often comes down to the superintendent, school board, or principal.

VITAL STATISTICS

State Education Agency Web Site:
www.pde.psu.edu/

State Education Agency Technology Contact:
John Bailey
(717) 705-4486
jbailey@state.pa.us

Pre-K-12 Enrollment: 1.8 million

Percent Children in Poverty: 18

Percent Minority Students: 21.2

Student per Instructional Computer: 4.6

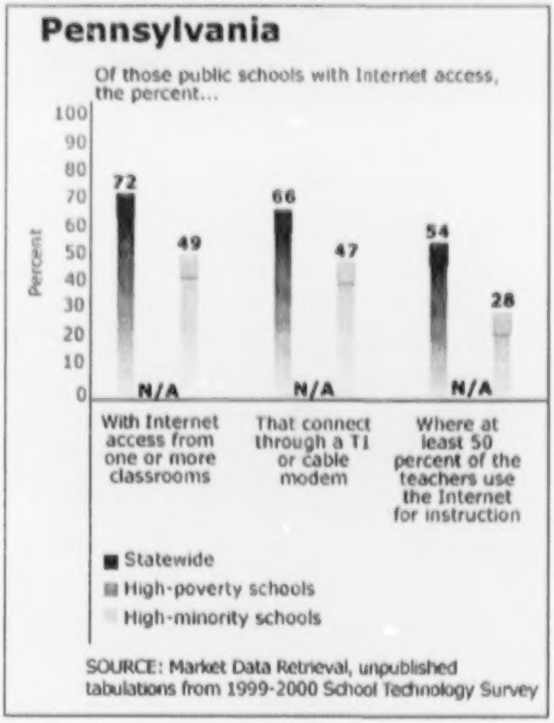
E-Rate Funding (through March 6, 2001): $160,279,454

(See "Notes on State Profiles.")

"Some of the best models we have for technology use in education are in rural and poor schools. Schools traditionally thought of as being left in the wake of the technology revolution are leading the revolution in many cases here," Bailey says. "And leadership is often the key."

Pennsylvania is trying to foster leadership with the Technology Leadership Academy, a three-year effort launched last year to train all the state's superintendents, more than 2,000 principals, and 1,000-plus school board members in how to better lead, manage, and budget for technology-as well as better understand how technology can help smooth school operations and raise student achievement. The state has pledged $1.5 million to the effort and is seeking additional support from private foundations.

Leadership is also critical in the state's Digital School District initiative, a two-year, $15 million project that has awarded competitive grants to three districts to become models in the use of technology to redefine and improve schools for the 21st century. Districts that won the grants are required to share their experience with schools across the state and to reach out to the community beyond the schoolhouse door. Demographically, the grant recipients are all over the map, Bailey says.



SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

Pennsylvania is trying in other ways as well to shift the emphasis from simply acquiring technology and connecting schools to the Internet to using technology to improve teaching and learning. Gov. Tom Ridge's Students Achieving Standards initiative, an outgrowth of Link-to-Learn, marks that shift. The initiative introduced by the Republican governor is channeling $15 million in competitive grants to districts in this budget year, fiscal 2001.

Under the program, which focuses on grades 3-5, districts agree to use one of several state-approved technologies to help with everything from improving teacher-parent communication to customizing instruction based on individual students' needs. Districts can use the grant money to buy any needed technology resources to support the effort. The state will then analyze which technologies paid off for certain schools and groups of students.

About 80 percent of the 122 districts that won awards in the first year of the three-year program are considered poor, Bailey says.

--Lynn Schnaiberg

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Rhode Island

School equity is a perennial subject of debate in Rhode Island, but when it comes to education technology, the state seems to have kept wealth from determining who are the haves and the have-nots.

Rhode Island's high-poverty schools, on average, have one multimedia- equipped computer for every 9.4 students, compared with an average state ratio of 1-to-10.7. Says William Fiske, the state's education technology coordinator: "You can no longer distinguish between districts' access to technology based on poverty alone; it's no longer related."

Fiske says the Ocean State, in fact, based its technology agenda on the idea of equal opportunity. In recent years, it has given out $3.4 million annually to school systems for such purposes.

VITAL STATISTICS

State Education Agency Web Site:
www.ridoe.net/

State Education Agency Technology Contact:
William Fiske
(401) 222-4600, ext. 2130
fiske@ride.ri.net

Pre-K-12 Enrollment: 158,000

Percent Children in Poverty: 19.4

Percent Minority Students: 24.5

Student per Instructional Computer: 6.5

E-Rate Funding (through March 6, 2001): $18,122,135

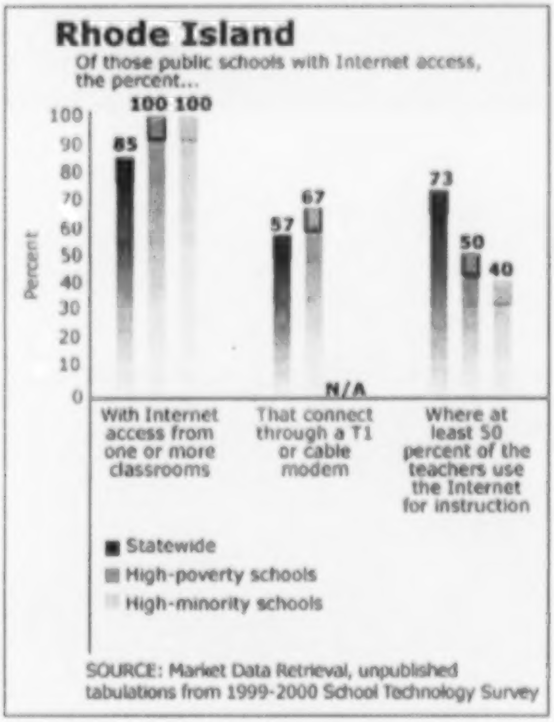
(See "Notes on State Profiles.")

Districts are required to have technology plans, but the money isn't reserved only for those with the best proposals. A district's take is based on student enrollment, poverty level, and ability to raise funds locally. Almost no restrictions are placed on how the money can be used, so long as it's technology related.

But public funding is only part of the state's efforts. Between 1996 and 2001, Rhode Island's largest telephone company provided schools with $9.5 million worth of telecommunications services at no cost, the result of a deal negotiated by state telecommunications regulators. State officials also played a pivotal role in creating rinet, a joint effort including higher education institutions and a Rhode Island television station. Among other services, the project offers free Internet accounts to teachers.

"We're doing a lot more than many corporations are doing, and at a fraction of the price," says Michael St. Jean, the director of technology for the Pawtucket public schools. "Pawtucket is one of the poorest districts in the state, and yet we have the most bandwidth."

Rhode Island also is channeling about $2 million a year in federal Technology Literacy Challenge Grant money into a series of state-organized training programs aimed at helping educators make the most of their schools' technology. Schools compete to take part, but state officials say they try not to neglect those in poor communities.


Rhode Island

Of those public schools with Internet access, the percent...

SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

In recent years, the state's technology-training initiatives also have received significant philanthropic support. That help includes a three-year, $5.7 million gift from the Rhode Island Foundation, in Providence, which paid for training about 2,400 teachers, each of whom got his or her own laptop computer. The Warwick, R.I.-based Champlin Foundations, which has given grants for instructional resources, also has been an important source of money for schools in need of hardware and software.

While appreciative of private efforts, many local school leaders argue that more public aid is needed to keep their technology maintained and up to date, and to pay for critical technical-support personnel. What's more, the state has yet to try to address the fact that students in low-wealth districts still are the least likely to have computers at home to use.

--Lynn Schnaiberg

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South Carolina

South Carolina has rolled up its sleeves and begun work on narrowing its digital divide, but there's plenty of work still to be done.

The state parallels the national averages on just about every indicator of students' access to technology. But students in poorer districts boast substantially more access to computers and the Internet than their counterparts across the country. A multimedia computer is available for every six students in high-poverty South Carolina schools, compared with a national ratio of 9-to-1.

Keeping up with technological changes appears to be the challenge for the Palmetto State and its education leaders. This year, severe state budget cuts from a slowing economy caused technology experts to worry that their equipment needs might go unmet-just as state academic- accountability measures take full effect.

"It's the ongoing costs that tend to really hurt our rural and impoverished schools," says Don Cantrell, a senior-level director in the state education department's technology office.

The state is putting a new data- keeping system in place for use in all schools, which will replace an aging system that limits the information that can be kept.

VITAL STATISTICS

State Education Agency Web Site:
www.sde.state.sc.us/sde/

State Education Agency Technology Contact:
Barbara Teusink
(803) 734-8395
bteusink@sde.state.sc.us

Pre-K-12 Enrollment: 647,000

Percent Children in Poverty: 18.1

Percent Minority Students: 44.8

Student per Instructional Computer: 5.0

E-Rate Funding (through March 6, 2001): $106,019,125

(See "Notes on State Profiles.")

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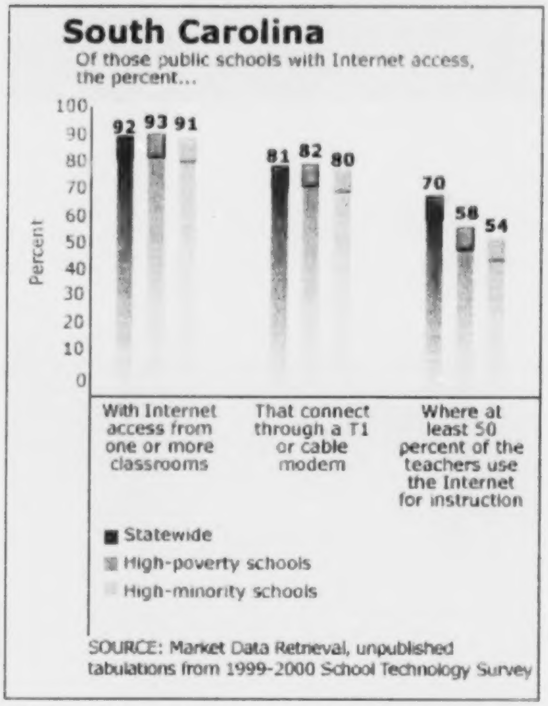

South Carolina

Of those public schools with Internet access, the percent...

SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

But the new software for student data can't be installed on many older computers, says Beverly I. White, the executive director of education technology services in Greenville County, the state's largest school district, with about 60,000 students.

White estimates that one- third of her district's computers can't handle such modern software, and she's worried that state leaders haven't made maintaining technology a top priority.

She and other school-technology leaders say the state is making progress on many other fronts, and many of those efforts appear aimed at helping less fortunate students and their schools gain access to and training in technology.

Even in the most remote and impoverished communities, schools generally have advanced links to the Internet: Ninety-eight percent of high-poverty schools are wired, compared with 92 percent nationally. Public libraries also have been wired with T1 or other advanced lines.

A lack of resources affects students' access to information, even if they are able to use adequate computers. Poorer districts don't always have the money for extensive cd-rom libraries or to tap online databases that charge schools to subscribe. To address that problem, the state has set up an Internet-based way for poorer schools to access such sites, paid for by state contracts with various providers. Some students even have home access to the sites, Cantrell says.

South Carolina distributes money for training teachers and parents in technology based on poverty level, tipping the scales slightly to poorer districts.

Inmates at state prisons who are trained in computer repair are taking donated hardware and sending refurbished systems to schools that need extra computers, Cantrell says.

Teachers were recommended by a law passed last year to acquire competency in technology before they renew their credentials. Districts can determine the competency standards; the state's own recommended standards are based on the International Society for Technology in Education's standards for teachers.

The state education department also has drawn up a staff-development plan in technology and posted it on its Web site.

—Alan Richard

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South Dakota

South Dakota's digital divide is narrowing, thanks to the state's efforts to connect schools to the state intranet, known as the Digital Dakota Network, which also provides access to the Internet.

Tammy Bauck, the director of the state education department's office of technology, says South Dakota will use its technology network to administer online state assessments in grades 3, 6, and 10. The online exam program has been pilot tested voluntarily by 14,000 students this year, and statewide use will begin next year, according to Ray Christensen, the state secretary of education.

The benefits of online testing are that "you don't have to wait for two months to get the results," he says. And because the tests adapt to students' ability, he adds, "you really can look at progress through the year."

VITAL STATISTICS

State Education Agency Web Site:
www.state.sd.us/deca/

State Education Agency Technology Contact:
Tammy Bauck
(605) 773-6118
Tammy.Bauck@state.sd.us

Pre-K-12 Enrollment:128,000

Percent Children in Poverty:11.7

Percent Minority Students:13.0

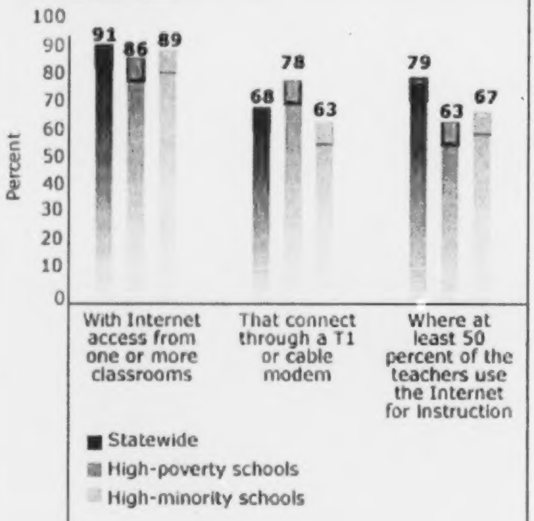
Student per Instructional Computer:3.2

E-Rate Funding (through March 6, 2001):$6,864,735

(See "Notes on State Profiles.")

South Dakota

Of those public schools with Internet access, the percent...



SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

The only problem with the testing has been providing computers for each student. Bauck says that the 13,400-student Rapid City district "had trouble trying to get access to computer labs for all their kids."

South Dakota districts pay for hardware and software, and Bauck says some poorer and more urban districts are having trouble putting enough computers in classrooms or labs to accommodate large numbers of simultaneous users.

A measure now moving through the state legislature would allow the state to buy 10,000 computers for schools, ensuring that districts have the equipment they need for the state testing.

The state has already put video-conferencing equipment in all high schools and most middle schools. Elementary school installation is also planned, Christensen says. The equipment allows students to take part in the state intranet's distance education program, which offers Advanced Placement, university, and standard courses. Students from any district can gain access to courses not available in their schools.

The classes are conducted entirely by full-motion video conferencing, Internet, and e-mail by the course provider and are supervised by a staff member at the remote location. Such courses have been offered in South Dakota since last fall, Christensen says. On the Digital Dakota Network, he says, "during the day the priority is always for classes."

The state conducts "distance teaching and learning academies" to help teachers learn how to teach distance education courses. It also offers technology academies that train teachers in the general use of the state intranet for teaching.

Next year, the state plans to expand the number of classes offered over the intranet for K-12 students, university students, and teachers.

--Vanessa Dea

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Tennessee

Tennessee is trying to cover all the bases in helping disadvantaged students gain access to technology and to make sure all teachers and administrators are prepared to use the equipment.

The Volunteer State was particularly sensitive to the digital divide when it drew up its technology policies, says Tom Bayersdorfer, the state education department's director of information technology. For instance, all teachers and administrators are required to have training in technology prior to earning their initial licenses.

"We think technology is a very integral part of the education system now," Bayersdorfer says. "Just having the technology available is not sufficient; [educators] have to know how to use it, or else you're just putting a lot of money into hardware that becomes outdated very quickly."

By getting technology to disadvantaged students, he says, the state is hoping to see higher test scores and other improved academic results.

VITAL STATISTICS

State Education Agency Web Site:
www.state.tn.us/education

State Education Agency Technology Contact:
Tom Bayersdorfer
(615) 532-1643
tbayersdorfer@mail.state.tn.us

Pre-K-12 Enrollment:905,000

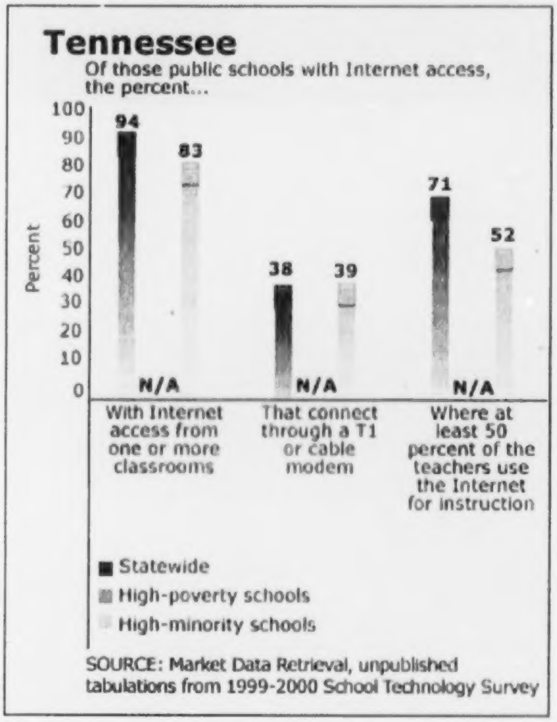
Percent Children in Poverty:18.1

Percent Minority Students:27.1

Student per Instructional Computer:5.4

E-Rate Funding (through March 6, 2001):$159,845,757

(See "Notes on State Profiles."**)**



Tennessee

Of those public schools with Internet access, the percent...

SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

Tennessee's education department is working with the telephone company BellSouth and other businesses to pilot a program that will put new computers, wired to the Internet, in the homes of poor children.

Six classes of 6th graders in impoverished urban and rural areas across the state are scheduled to receive the computers July 1. Researchers then will study the students' academic performance over the next year to see if the ready access to computers improves achievement.

The education department also is working with other agencies to find ways to get more technology to needy students and their communities. For instance, state education officials are working with the state library system to buy more computers and get them wired to the Internet.

Currently, the state has about 150,000 Internet-accessible computers for 900,000 students. Now the state is focusing on training educators to use those computers in the classroom, Bayersdorfer says.

State education officials have worked with colleges and universities to create the technology test for new teachers, based on requirements in the certification standards for teachers and the academic standards for students.

But so far, there are no requirements for teachers and administrators already working in schools. Instead, the state spends about $5 million a year to send every teacher and administrator to a technology professional-development workshop for five days.

In February, the National Education Goals Panel, in its annual "Promising Practices" report, recognized Tennessee as leading the nation with the highest percentage of 8th grade mathematics teachers--54 percent--having computers available in math classrooms.

Speaking at a ceremony to announce the recognition, state Commissioner of Education Vernon Coffey said the technology would help educators share information and would improve instruction for Tennessee students.

--Joetta L. Sack

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Texas

Texas is two-stepping its way toward closing the digital divide in its schools, at least when it comes to Internet access.

The Lone Star State has Internet-linked computers in 96 percent of its classrooms--a big jump since 1997, when researchers at Texas A&M University first began surveying schools on their use of education technology. At the time, says Jon Denton, the lead researcher on that survey, only 20 percent of classrooms had Internet access.

The state's progress is due in part to the way it pays for technology development in its schools.

Rural districts in need of Internet and distance-learning services, for example, get priority for grants from the state's Telecommunications Infrastructure Fund. Financed through a tax on telephone service, the fund is designed to help schools, nonprofit health-care facilities, libraries, and higher education institutions connect to the Internet.

Geographic balance is also a consideration for other state grants that go to help schools create models of excellent technology use.

VITAL STATISTICS

State Education Agency Web Site:
www.tea.state.tx.us/

State Education Agency Technology Contact:
Anita Givens
(512) 463-9400
agivens@tea.tetn.net

Pre-K-12 Enrollment:4 million

Percent Children in Poverty:21.8

Percent Minority Students:56.9

Student per Instructional Computer:4.3

E-Rate Funding (through March 6, 2001):$417,735,801

(See "Notes on State Profiles."**)**

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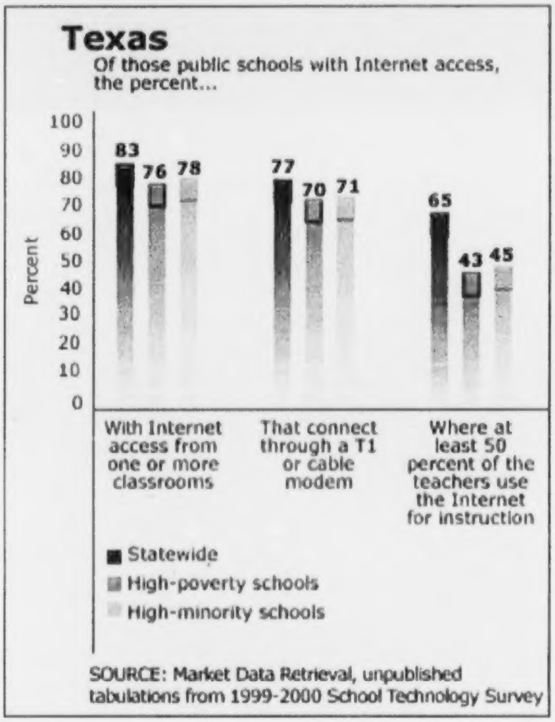

SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

And every school in the state gets $30 per student a year to build its technology programs.

Another way the state hopes to even out technology access in schools is through the Texas Library Connection, which gives schools the means to use 44 million texts, magazines, journals, newspaper titles, encyclopedias, and government documents that are available online. About half the state's public school campuses are equipped to partake of those services. And state school officials are working with the telecommunications fund to help the rest upgrade their programs so they can participate, too.

"Much good has been done," says Kate Loughrey, an assistant for educational technology for the Texas Education Agency. "Much good remains still to be done."

Statistics show that on a per-student basis, schools with high concentrations of poverty still have fewer instructional computers, fewer Internet-linked computers, and fewer multimedia computers than do Texas schools on average. But the gap is not huge. Disadvantaged schools, for example, have an average of one Internet-linked computer per 8.6 students; the statewide average is one such machine per 7.3 students.

Loughrey says another problem is that the state faces a shortage of technology-savvy teachers. The State Board for Educator Certification moved toward addressing that problem last year by approving new standards in technology for all beginning teachers, regardless of whether they teach kindergarten or computer applications. Starting in 2002, teachers will have to pass tests based on those standards in order to be licensed.

--Debra Viadero

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Utah

Utah is one of the most computer-savvy states in the nation.

To begin with, a higher percentage of households in Utah have computers--66.1 percent--than in any other state, according to a survey released last year by the U.S. Department of Commerce.

And the state's schools are generally better connected to the Internet than schools elsewhere in the country. Nationwide, 82 percent of schools have Internet access in one or more classrooms, compared with 92 percent in Utah, according to Market Data Retrieval, a Shelton, Conn., market research firm.

Moreover, the state appears to have done a good job of bridging the digital divide between high- and low-poverty schools--at least when it comes to Internet access. For schools defined as high-poverty, 89 percent in Utah have Internet access in one or more classrooms, compared with 76 percent nationwide.

Utah officials say they have been committed to closing the digital divide since the state launched its first Educational Technology Initiative in 1990. The ETI is the state's main funding program for school technology hardware, software, network infrastructure, and professional development.

VITAL STATISTICS

State Education Agency Web Site:
www.usoe.k12.ut.us

State Education Agency Technology Contact:
Vicky Dahn
(801) 538-7732
vdahn@usoe.k12.ut.us

Pre-K-12 Enrollment:475,000

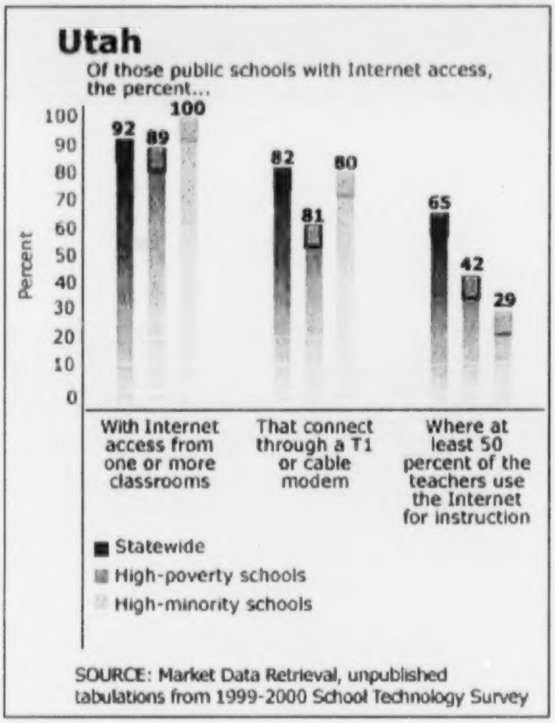
Percent Children in Poverty:13.8

Percent Minority Students:13.1

Student per Instructional Computer:5.5

E-Rate Funding (through March 6, 2001):$17,209,925

(See "Notes on State Profiles.")



Utah

Of those public schools with Internet access, the percent...

SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

The formula for the program distributes the first 25 percent of aid equally to each of Utah's 40 school districts, whether they are large or small, suburban or rural. The remaining 75 percent of the money is distributed on a per-pupil basis. The aid, however, does not take into account a school's level of poverty.

Still, state officials believe the money is addressing inequities because so much of it is going to rural areas.

"Rural communities don't have some of the advantages that suburban ones do," says Vicky Dahn, the director of curriculum and coordinator of instructional technology for the state office of education. "They don't have as many businesses they can form technology partnerships with."

The state will spend nearly $9 million next year for "ongoing" costs in the ETI. That money pays for maintenance of computer equipment and other basic costs. Another $8.25 million has been appropriated to pay for such new projects as multimedia workstations and desktop video programs.

Gov. Michael O. Leavitt, a Republican, had proposed to spend as much as $15 million for those projects, but the legislature agreed to pay for only a little more than half of his request.

"We never get everything we want," Dahn says.

The state provides an additional source of money for school Internet connections. Some $11 million next year will cover distance education and telecommunications costs related to the Internet for each school district office and public secondary school. However, a school's level of poverty is not considered when this money is given out. Elementary schools' costs are the responsibility of school districts, Dahn says.

One project on the Utah Education Network, as the state-sponsored distance-learning project is known, is a series of curriculum plans on the Web that are related to the 2002 Winter Olympics in Salt Lake City. The state is seeking to engage educators and students in topics that reach beyond Utah's borders by using the Olympics to teach lessons about math, physics, history, and other subjects.

"We really want to use the Olympics as a teaching moment," Dahn says, "so students might study the physics of downhill skiing, or the history of the Olympic movement."

--Mark Walsh

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Vermont

As befits a state with a long tradition of local control over schools, Vermont gives its more than 250 districts considerable leeway in setting priorities for technology.

In fact, Vermont doesn't provide districts with any state funding for technology. But it does require that districts provide information to the state each year on equity in student access.

Technology officials believe the state doesn't have a significant problem with the digital divide. The reason, according to Philip Hyjek, the state's technology coordinator, is that Vermont has specifically targeted the federal technology aid it receives to schools with high percentages of students living in poverty.

VITAL STATISTICS

State Education Agency Web Site:
www.state.vt.us/educ/index2.htm

State Education Agency Technology Contact:
Philip Hyjek
(802) 828-3111
phyjek@madriver.com

Pre-K-12 Enrollment: 104,000

Percent Children in Poverty: 13.5

Percent Minority Students: 3.2

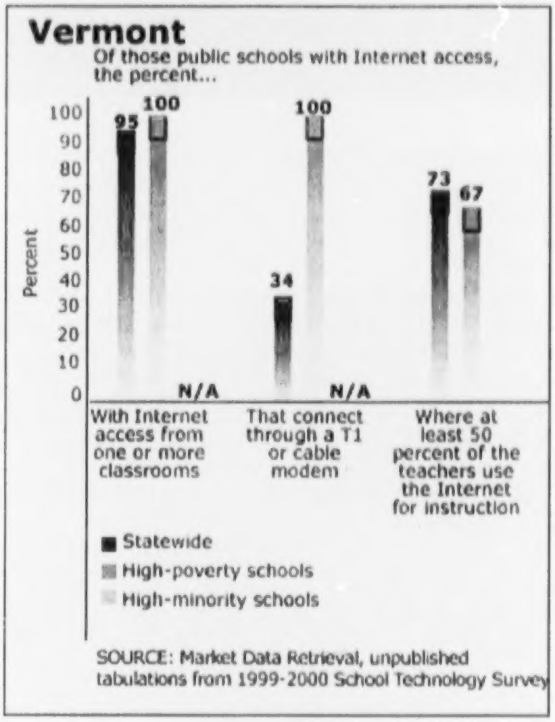
Student per Instructional Computer: 4.9

E-Rate Funding (through March 6, 2001): $5,326,635

(See "Notes on State Profiles.")

"I think between the Technology Literacy Challenge Grant Fund and the E-rate, we've made better than considerable progress in closing the digital divide," Hyjek says. "Some of the poorest schools in the state have the best technology."

Vermont, a predominantly rural state with a wide range of wealth and poverty, has not spent a lot of time on technology planning in recent years because it has been consumed by an overhaul of its school finance system. The 1997 measure, Act 60, created a statewide property tax to provide more equitable funding for every student in Vermont and imposed new academic requirements.



SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

While the state has focused on ensuring that federal technology aid is equitably distributed, Vermont has shied away from imposing technology-training requirements on current teachers.

The state is working on regulations that would require new teachers to receive training in using technology before they are certified. But so far, state officials have not mandated that teachers already in the classroom receive any training in or demonstrate special knowledge of technology for recertification--and Hyjek believes any such proposal would face an uphill battle.

"That would never fly here," he says. "This is a locally controlled state. Vermont tends not to say, 'You have to.' "

Vermont is in the process of drafting job guidelines for district-level technology coordinators, with the goal of encouraging districts to hire people who understand how to integrate technology into the curriculum, not just the technical aspects of the equipment, Hyjek says.

But without state funding, it wouldn't be politically feasible to require districts to create such jobs, he adds, given that many smaller districts don't even have a curriculum specialist.

--Joetta L. Sack

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Virginia

Virginia schools are working to meet broad technology goals laid out in the state's Standards of Learning and Technology Initiative, passed by the legislature in 1999.

Under that plan, Virginia school districts are eligible to receive $26,000 per school from the state for capital purchases. Along with a 20 percent match in local dollars, the money is intended to ensure that by 2003, all Virginia high schools have Internet-ready local-area networks; high-speed, high-bandwidth capabilities for instructional, remedial, and testing needs; and a student-to-computer ratio of 5-to-1.

Money for the $113 million, two-year program is being distributed to the state's high schools first. Once they have met the required goals, the remaining aid will go to middle and elementary schools. The state money is to be used for capital purchases only--including computers, servers, and software--and the state requires that for every $1 in state aid a school spends on software, $13 must be spent on hardware.

VITAL STATISTICS

State Education Agency Web Site:
www.pen.k12.va.us/

State Education Agency Technology Contact:
Lan Neugent
(804) 225-2757
lneugent@mail.vak12ed.edu

Pre-K-12 Enrollment:1.1 million

Percent Children in Poverty:9.0

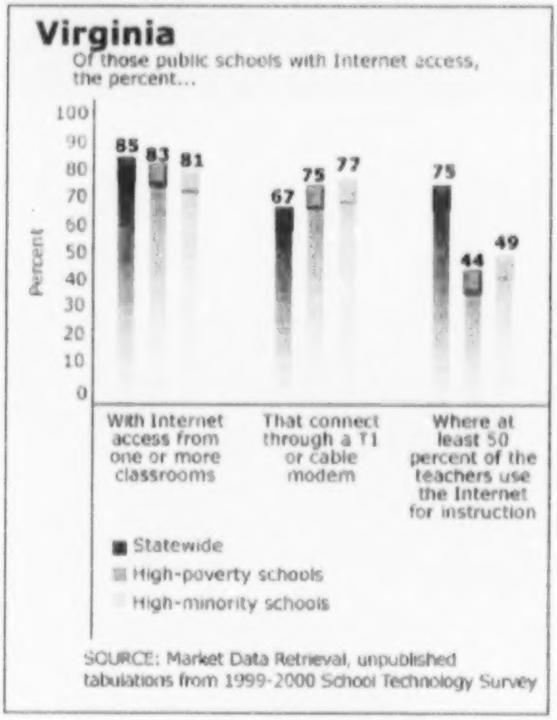
Percent Minority Students:35.7

Student per Instructional Computer:4.7

E-Rate Funding (through March 6, 2001):$69,237,531

(See "Notes on State Profiles."**)**

The law requires that at least 25 percent of a school's SOL Technology Initiative matching funds be used for teacher training. Federal Technology Literacy Challenge Grant aid and local funding underwrite the bulk of teacher-technology training, according to state education department officials.


Virginia
Of those public schools with Internet access, the percent...

SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

The initiative also requires that by 2003, all Virginia teachers demonstrate their skills in technology, in line with the state's technology standards for students, which were mapped out in the late 1990s. Each school district is left to devise its own yardstick to measure teachers' competence in technology.

A portion of the state's Standards of Learning exam measures how close 5th and 8th graders are to meeting technology standards, and scores indicate that most students are understanding technology and are fairly proficient in its use, says Lan W. Neugent, the state education department's assistant superintendent for technology. Last year, for example, 85 percent of 5th graders and 78 percent of 8th graders taking the tests passed, up from respective passing rates of 72 percent and 64 percent in 1998.

Virginia surveys schools and districts annually to determine, among other information, how many computers are in schools, which schools are connected to the Internet and how they are connected, what schools' technology-infrastructure needs are, and how many schools use filtering systems to block objectionable online material. School districts also submit yearly technology-plan updates that include information on such topics as staff training and staff readiness to use technology. The state assists schools that are not as technologically savvy as they should be, Neugent says, by providing them access to instructional and assessment resources, among other forms of assistance.

The state does not collect data on the number of school technology support staff. But a recent survey of high schools found that the state had an average of .73 full-time technology-support employees per high school, and .35 full-time technology-support positions per 100 instructional computers.

For students with special needs, meanwhile, the Education Department's special education division provides grants for school technology.

--Kerry A. White

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Washington

Thanks to a $60 million network completed in 1999, most of Washington state's 296 districts are linked by T1 lines to the Internet, to one another, and to each of the state's two- and four-year colleges.

As a result, students in poor districts now have the same opportunities as their better-off counterparts to take distance-learning and online Advanced Placement courses.

In the 1999-2001 biennium, with $500,000 from the legislature, more than 1,000 students earned higher education credits in mathematics and science through Internet-based AP classes. A recent request for $2 million would expand past 80 the number of districts participating during the 2001-03 biennium.

VITAL STATISTICS

State Education Agency Web Site:
www.k12.wa.us/

State Education Agency Technology Contact:
Clare Donahue
(360) 586-2515
cdonahue@ospi.wednet.edu

Pre-K-12 Enrollment: 1 million

Percent Children in Poverty: 11.1

Percent Minority Students: 24.7

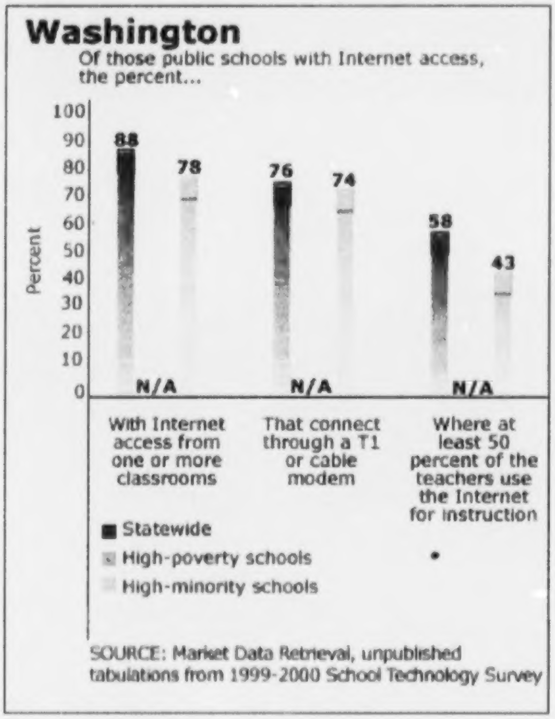
Student per Instructional Computer: 4.7

E-Rate Funding (through March 6, 2001): $78,513,590

(See "Notes on State Profiles.")

Another outcome of the K-20 Educational Network is that students can access the Internet from roughly 95 percent of the state's classrooms, according to state officials. That figure is up from 64 percent in 1998, and 4 percent in 1994. The classrooms have an average of one computer for every four students, though some of the machines are older and limited in function.

State leaders were hoping to build on those advances during this year's legislative session. State schools Superintendent Terry Bergeson has proposed including technology expenses in the state's funding formula for basic education. The goal is to make computers and other technology "as ubiquitous as the telephone and electricity," without compromising other initiatives that might be subject to annual budget crunches, a spokeswoman for the state education department says.



SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

The department has also requested $1.7 million for the 2001-03 biennium for maintenance of the K-20 network and teacher training.

And education leaders are pushing for $13 million to launch the Washington Virtual Education Space project, an online system of educational resources for teachers, parents, and students. Advocates believe the so-called WAVES project is crucial in this era of high-stakes testing.

"This would put pressure on low-performing schools, which sometimes have a correlation to poverty-based schools," says Clare Donahue, the education department's assistant superintendent for digital education, adding that many teachers still don't want to use technology in the classroom. "It would give them better information on how to reach better academic scores."

The project would be developed at one of the state's nine educational technology support centers. The legislature has appropriated about $4 million annually since 1995 for their operation.

To help rural schools keep up with the technology that many poorer, urban schools receive through computer donations from nearby businesses, the state department of corrections and several other agencies last year kicked off Computers 4 Kids, a program in which inmates refurbish older computers that are then shipped to the neediest schools.

More than 5,000 computers--roughly 400 a month--have been distributed so far.

--Robin L. Flanigan

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West Virginia

While not addressing the digital divide outright, West Virginia leaders say they have been mindful of equity in all aspects of education, including technology, since a landmark 1982 decision in a school finance lawsuit.

The court ruling required the legislature to restructure the funding formula so that students would have the same educational opportunities regardless of their school districts' property wealth.

Because of the ruling, school technology resources have been distributed under a system based on enrollment, technology need, poverty, and achievement objectives virtually for as long as schools in the state have been using computers. Taking those factors into account ensures that the system is fair, says Brenda Williams, the school technology director for the West Virginia Department of Education.

For this fiscal year, which began last July 1, the state dedicated some $23 million to school technology. The bulk of the money underwrites three major programs. Those and other initiatives are coordinated with the education department's office of special education, thus ensuring that students with disabilities or other special needs have the same access to technology as other students, Williams says.

VITAL STATISTICS

State Education Agency Web Site: www.state.wv.us/

State Education Agency Technology Contact:
Brenda Williams
(304) 558-7880
brendaw@access.k12.wv.us

Pre-K-12 Enrollment: 285,000

Percent Children in Poverty: 27.5

Percent Minority Students: 5.2

Student per Instructional Computer: 3.9

E-Rate Funding (through March 6, 2001): $24,136,121

(See "Notes on State Profiles.")

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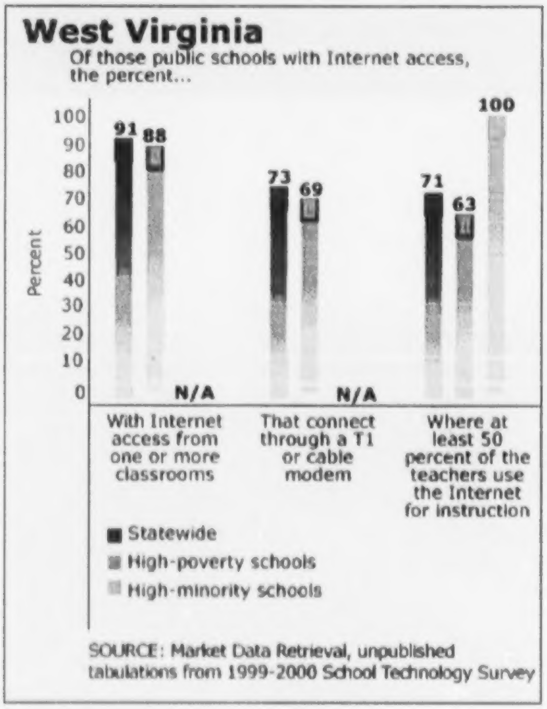

SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

Since 1990, the state's Basic Skills/Computer Education Program has provided more than $100 million—in incremental annual allocations—for hardware, software, and training to help teach basic skills to elementary school pupils. In 1999, researchers from Columbia University credited the program for gains in mathematics, reading, and language arts skills; the researchers also noted the gains had helped narrow achievement gaps between groups of students based on gender and family income.

Since 1997, the SUCCESS Initiative—Student Utilization of Computers for the Enhancement of Scholastic Skills—has provided technology resources for middle and high school students. The program has received about $8 million annually, and the money is distributed to county school districts on a per-pupil basis. So far, the SUCCESS Initiative has trained some 5,000 teachers and provided funding for 15,000 computers, as well as networking, wiring, servers, and Internet connections.

The World School/Internet program has helped wire classrooms—83 percent of the state's classrooms can access the Internet—and provides E-rate discounts and training on integrating technology into instruction.

Teacher training has been a mainstay of the state's major technology initiatives and a focus of many grant programs. Various state staff-development programs provide incentives—laptops, stipends, equipment, software, and other classroom materials—to teachers and administrators who use technology in their schools and classrooms.

—Kerry A. White

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Wisconsin

Wisconsin has nearly made good on its pledge to wire all its schools to the Internet by 2002 and is now focusing on integrating technology into the curriculum.

The student-to-computer ratio in the Badger State is 3.7-to-1, well below the national average of 4.9-to-1. That ratio is only slightly higher (4-to-1) in schools serving poor children, compared with the national norm of 5.3-to-1 for such schools.

Now the challenge is to ensure that teachers know how to use the tools they've received, says Doris J. Hanson, the executive director of the state's Technology Educational Achievement agency, or TEACH, which administers state-financed technology programs.

VITAL STATISTICS

State Education Agency Web Site:
www.dpi.state.wi.us/

State Education Agency Technology Contact:
Neah Lohr
(608) 266-3856
neah.lohr@dpi.state.wi.us

Pre-K-12 Enrollment:876,000

Percent Children in Poverty:13.5

Percent Minority Students:18.6

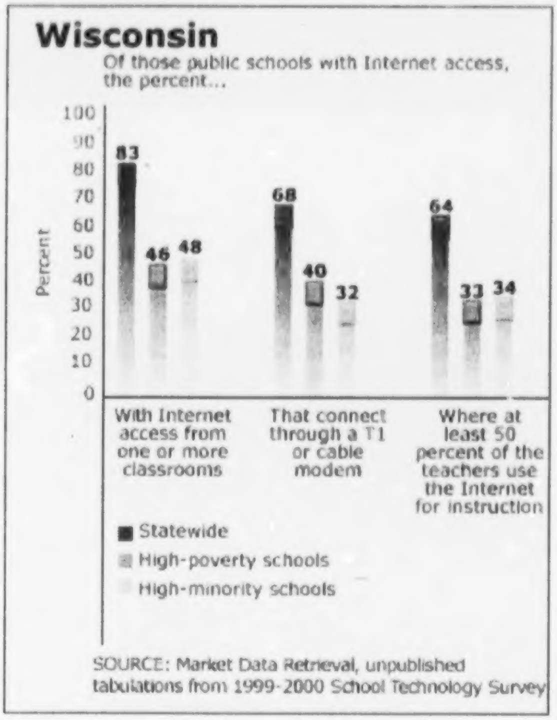
Student per Instructional Computer:3.7

E-Rate Funding (through March 6, 2001):$89,548,259

(See "Notes on State Profiles."**)**

"My top priority now is teacher and staff development," Hanson says. "Only about 20 percent of teachers are actually able to integrate technology into the curriculum. That's why we're working to raise the bar."

Though a majority of teacher-training initiatives in Wisconsin are financed through federal grants and administered by the state education department, school districts are authorized to spend a share of the $35 million allocated to them in the current fiscal year in block grants through the TEACH agency for such endeavors, Hanson says. Each district received $5,000 in base funding; additional aid was based on enrollment.



SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

In addition, the agency awarded $4 million this year in the form of competitive grants to 15 districts to produce videos illustrating ways to integrate technology into daily lessons. Those videos have been posted online in an effort to share the best teaching practices, a service especially needed in Wisconsin's rural communities.

The agency continues to put priority on upgrading computer networks by providing subsidized data and video lines to school districts, technical colleges, libraries, and correctional facilities, Hanson says. Speedy T1 lines cost schools just $100 a month, even though the companies that provide them typically charge the state about six times that amount. Video lines are available for $250 per month, a savings of $3,200 monthly. Faster links mean easier access to information from around the state, the nation, and the world--an opportunity that "levels the playing field" for all demographic groups in Wisconsin, Hanson says.

Some rural communities, however, can't take advantage of T1 connections. That's because their phone lines are controlled by small, locally owned companies that don't have the capacity to use the connections, a problem that exacerbates the digital divide, says Rep. Luther S. Olsen, a Republican and the vice chairman of the education committee of the state Assembly. So far, he says, no real solutions to the problem have emerged.

--Julie Blair

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Wyoming

As its name suggests, the Wyoming Equality Network was created to bring more equity to the Equality State's schools and communities. Completed in 1999, the high-speed data and video network connects all Wyoming public schools, as well as community colleges and the state university.

"When we look at the digital divide, we're also looking at how it impacts communities as a whole, and that was the intent of the network--to look at schools and communities at large," says Linda Carter, the state technology director. "Technology became part of the solution to inequality in our schools generally. Technology was one way to bridge the gaps in the educational system."

All of Wyoming's public schools have been connected to the Internet; schools in the most remote parts of the state gained access by satellite. To date, between 80 percent and 85 percent of individual classrooms have Internet access, Carter says. And the state beat its own July 2001 deadline by installing two-way interactive video in all of the state's high schools by last fall.

For students, such technology helps bridge the gap in curricular offerings so they can take, for example, Advanced Placement or foreign-language classes whether they attend the most remote high school or a school in the state capital. The video system also allows teachers and other community residents to receive distance education as well.

VITAL STATISTICS

State Education Agency Web Site:
www.k12.wy.us/

State Education Agency Technology Contact:
Linda Carter
(307) 777-6252
lcarte@educ.state.wy.us

Pre-K-12 Enrollment:90,000

Percent Children in Poverty:14.6

Percent Minority Students:11.6

Student per Instructional Computer:3.0

E-Rate Funding (through March 6, 2001):$7,315,825

(See "Notes on State Profiles."**)**

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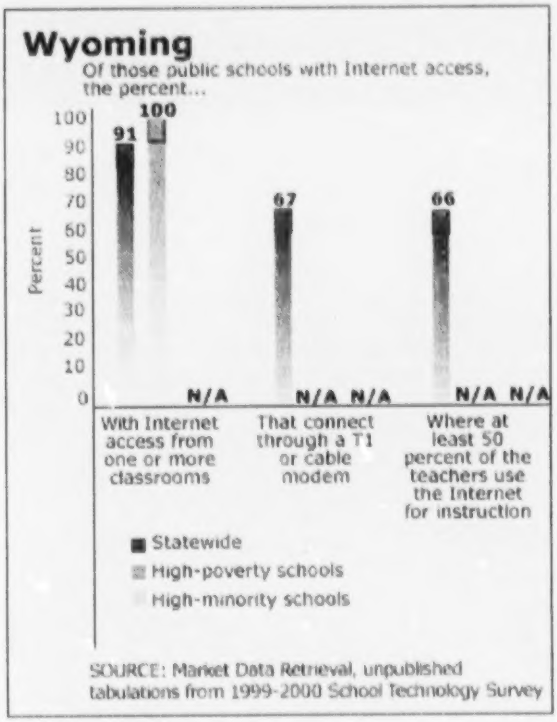

Wyoming

Of those public schools with Internet access, the percent...

SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

But while Wyoming's schools are on a relatively equal playing field for Internet access, how they're taking advantage of technology varies tremendously, Carter acknowledges.

"Some districts have moved forward with actually using this [in classrooms] and have made great efforts to develop professional development that supports that, along with maintaining and keeping networks and computers up," she says. "And others are still struggling. And that's where the divide comes into play here."

For the biennium that ends June 30, Wyoming has allocated $11.2 million for school technology. Of that, $7 million is earmarked for maintaining or expanding technology infrastructure. Most of the remaining $4.2 million is expected to go toward building a cadre of mentor teachers and administrators who know how to use the software and hardware and integrate technology into the classroom. The goal is to train a minimum of four people in smaller districts, proportionally more in larger districts, Carter says.

"It's really building the standards-based classroom with technology as a support," she says.

As an additional support, Wyoming launched a Web-based resource kit last fall to help teachers better link their teaching to the state's academic standards.

--Lynn Schnaiberg

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The New Divides

STATE PROFILES

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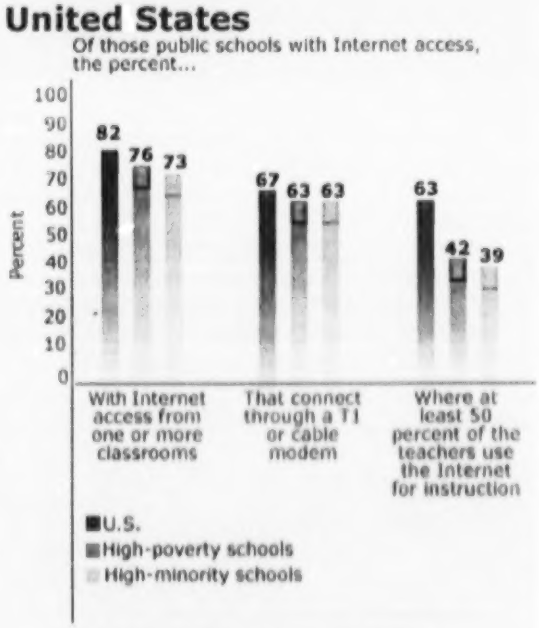
May 10, 2001

Notes on State Profiles

Pre-K-12 Enrollment (2000-01): U.S. Department of Education, National Center for Education Statistics, "Early Estimates of Public Elementary and Secondary Education Statistics: School Year 2000- 2001," February 2001. The figure includes students enrolled at a school or local education agency on the school day closest to October 1, 2000. Membership includes all students in prekindergarten through grade 12 and ungraded classes.



SOURCE: Market Data Retrieval, unpublished tabulations from 1999-2000 School Technology Survey

Percent of Children in Poverty (1998): National Center for Children in Poverty, "Child Poverty in the States: Levels and Trends from 1979 to 1998," August 2000. The figure includes all children under the age of 18 in poverty. In 1998, the official poverty threshold for a family of four was $16,660.

Percent of Minority Students (1999-00): U.S. Department of Education, National Center for Education Statistics, "Public School Student, Staff, Graduate Counts by State, School Year 1999-2000" January 2001. The figure includes all students not classified as "White, Non-Hispanic" in the report.

Students per Instructional Computer (1999-00): Market Data Retrieval, "Technology in Education 2000". "Instructional computer" refers to any computer used for student instruction.

E-rate Funding (2001): Unpublished tabulations from the Schools and Libraries Division of the Universal Service Administration Company. The federal E-rate program provides discounts on telecommunications services, Internet access, and internal connections, with priority given to schools and libraries that serve poorer students or are located in rural areas. Since the beginning of the program in January 1998, a total of over $5.7 billion has been awarded. The dollar figure for each state is the total funding awarded to schools and libraries through March 6, 2001. Updates on how much each state has been awarded are posted at: www.sl.universalservice.org.

Note: Many figures in the state narratives in this section are state-reported.

Consequently, on similar indicators such as student- to-computer ratios, those numbers may differ from figures cited elsewhere in the report.

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